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Utah Off-Highway Vehicle Owners' Specialization and Its Relationship to Environmental Attitudes and Motivations

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UTAH OFF-HIGHWAY VEHICLE OWNERS' SPECIALIZATION AND ITS RELATIONSHIP TO ENVIRONMENTAL ATTITUDES AND MOTIVATIONS

by

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ABSTRACT

Utah Off-Highway Vehicle Owners' Specialization

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Attitudes and Motivations

by

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Off-Highway Vehicle (OHV) use has grown enormously on Utah's public lands and is one of the most contentious and difficult issues for federal, state, and local land management agencies to address and provide for. Despite OHV use's meteoric rise in popularity and its ongoing public conflicts, little is known about OHV recreationists. This thesis develops a typology that identifies within-activity differences related to recreation specialization; it also determines differences in OHV owners' environmental attitudes and motivations. Findings show Utah's owners comprise a range of use along the recreation specialization continuum. Results also indicate that an OHV owners' specialization level is not a significant determinant of either their environmental attitude or four out of the seven given motivations for participation in the activity. Specialization is, however, directly correlated to three specific motivation domains: achievement/stimulation, independence, and meeting new people. Overall, the recreation

specialization framework, broadly interpreted, was successfully utilized to develop a typology of use which can inform resource management decisions.

(191 pages)

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CONTENTS

Page

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

INTRODUCTION AND PURPOSE

Off-Highway Vehicle Use in Outdoor Recreation

Increasing Demand for Outdoor Recreation

The U.S. population has grown rapidly over the past half-century, rising from 179 million in 1960 to more than 281 million in 2000 (Carter et al., 2006). Consequently and unsurprisingly, as the general population has increased so too has the demand for recreational opportunities throughout the nation (Moore & Driver, 2005). This is a trend noticed throughout the country and Utah is no exception. The fact that Utah's population has grown faster than the national average (Office of Vital Records and Statistics, 2007), coupled with the diverse and unique recreational resources available throughout the state, results in a demand for outdoor recreational opportunities that has grown precipitously.

At the national level, the growing popularity of outdoor recreation was first inventoried and analyzed through the completion of the U.S. National Recreation Survey completed for the Outdoor Recreation Resource Review Commission (ORRRC) in 1960. The 1960 ORRRC survey collected data on a wide range of recreational activities, from hiking to fishing and canoeing. However, the landscape of outdoor recreation in the United States has changed dramatically since the middle of the 20th century. The expansion of high speed transportation systems swiftly changed the availability of outdoor recreation opportunities. The expansion of the U.S. Interstate highway system has made previously inaccessible, distant, and remote areas now easily reachable. Also, many new methods of recreation have been introduced to the list of the nation's diverse

outdoor recreational opportunities; rock climbing, mountain biking, and the introduction of snowboarding just to name a few.

However, all of these activities arguably pale in comparison to the introduction of motorized recreation, namely in form of Off-Highway Vehicle use, in the amount of change brought to bear on the national outdoor recreation landscape. In the 1960 ORRRC survey, "motorized recreation was not even on the radar as a recreational activity" (Cordell, Betz, Green, & Owens, 2005). There were of course 4-wheel drive vehicles, such as the Jeep, that were used to gain access to the backcountry, but the use of motorized vehicles driven as the sole purpose of a recreational activity was largely unheard of and certainly not as a "population-wide outdoor activity" (Cordell et al.). This all changed fairly rapidly however, after the personal off-highway motorcycle and all-terrain vehicle (ATV) were introduced to the general public in the late 1950s (Sheridan, 1979). The evolution of OHV use and its explosive growth is a relatively recent development after all, extending primarily across the last three and a half decades.

Growth in OHV Use Nationwide

Recent studies have shown the explosive growth of OHV use is occurring nationwide. According to the National Survey of Recreation and the Environment, participation grew by more than 100% from 1982 to 2001; between 2001 and 2005, participation increased at a rate just above 32% (Cordell et al., 2005). This enormous growth has led social scientists to conservatively estimate that 39.7 million Americans, or almost one fifth of the U.S. population, participated at least once in OHV recreation during 2004 (Cordell et al., 2005).

Measuring the growth of the activity by the number of individuals who have participated in it is not the only way popularity can be expressed. Frequently OHV sales are noted; the Bureau of Land Management reported in 2001, that "recreational enthusiasts are buying motorized OHVs at a rate of 1,500 units per day nationwide, with nearly one third of them doing so as first-time buyers of such vehicles" (2001b, pp. 1-6). The Motorcycle Industry Council, the primary trade organization that represents the ATV and motorcycle industries in the United States, reports OHV annual sales have more than tripled between 1995 and 2003, to more than 1.1 million vehicles sold in 2003 (Cordell et al., 2005).

The massive influx of OHV use has been primarily attributed to two key factors: first, the expansion of participation in outdoor recreation as baby boomers have aged (many seek ways to get outdoors and stay active despite physical limitations); and second, the rapid development of technology that has led to the innovation and introduction of newer, advanced, and more capable forms of recreation (Havlick, 2002; Stokowski & LaPointe, 2000). Several other factors have also been cited, albeit less frequently, for the rapid popularity of OHV use. These factors include: greater public interest in unconfined, outdoor recreation opportunities; rising disposable income; a healthy domestic economy; and the rapid growth of the American West's cities and suburbs, whose expansion and population growth has brought Westerners closer to once-remote public lands (Bureau of Land Management, 2001b).

Consequences of Growth

No matter the reason for the boom in OHV use, it is now a central and unavoidable component of the public land management process. The inherent consequences of growth involve conflicts that have been recognized since the activity's inception (Sheridan, 1979). These conflicts have been identified as both biophysical and social in nature; these include matters related to soil erosion and trail degradation, vegetation, water and air quality, noise, wildlife and fish, and social conflicts between different types of recreationists (Havlick, 2002; Moore, 1994; Stokowski & LaPointe, 2000). One salient consequence of growth public officials are confronting is the environmental damage resulting from a lack of self-regulation within the OHV community regarding legal use of designated trail systems (i.e., the disregard for trail designations that indicate whether an area is open or closed to motorized use).[1] "According to land managers, citizen complaints, and conservation group reports, OHV users' disregard for road closures, private property, and trail restrictions is commonplace" (Havlick, p. 103).

Dealing with self-regulation within the activity is only one of the many issues agencies have been facing due to the activity's popularity. Its growth has brought contention and debate that range in scope from the general purpose of land management agencies (e.g., open access and use versus conservation and preservation) to the ethical implications of participating in motorized recreation. Agencies that manage recreation resources have been faced with these conflicts for decades and have tried to address them

[1] This perception is based on a nationwide study of all National Forests in 1998. The study determined that 71 percent of the responding forests recorded resource damage due to motor vehicle violations including improper use of forest trails, illegal use of vehicles off-road, or violating standards for noise, smoke, safety, or state laws (Wildlands CPR, 1999).

at the national level (Bureau of Land Management, 2001a; USDA Forest Service, 2005) as well as at the state level (Bureau of Land Management, 2001b) in order to deal with the unique issues and public lands policies within each state. I now focus attention on how OHV use has evolved in Utah as well as the unique management issues within the state.

Off-Highway Vehicle Use in Utah

OHV Growth in Utah

The state of Utah has been no exception to the dramatic increase in OHV use. The number of registered OHVs in Utah has more than tripled in the past eight years, up from 51,686 in 1998, to 172,231 in 2006, a 233% increase (Utah Department of Motor Vehicles, personal communication, March 2007) (Figure 1).

The reasons for this growth are not unlike the reasons noted for growth nationwide: a healthy economy, increased leisure time and disposable income available, the introduction of fast and efficient transportation systems, etc. However, the reasons for growth in Utah's OHV population differ from that of the nation as a whole in two distinct ways. First, Utah is home to a vast array of public land; nearly 67% of the state (Utah Division of Parks and Recreation, 2003) provides the unique setting characteristics for the activity to flourish. These lands offer a broad spectrum of environments upon which OHV use is dependent. Open play areas like Little Sahara, Coral Pink Sand Dunes, and Five-mile Pass offer vast amounts of land where owners have no restrictions as to where they can go or how far they can push the limits of their vehicles. The state also offers areas like Skyline Drive and the Piute Trail, which offer both linear and

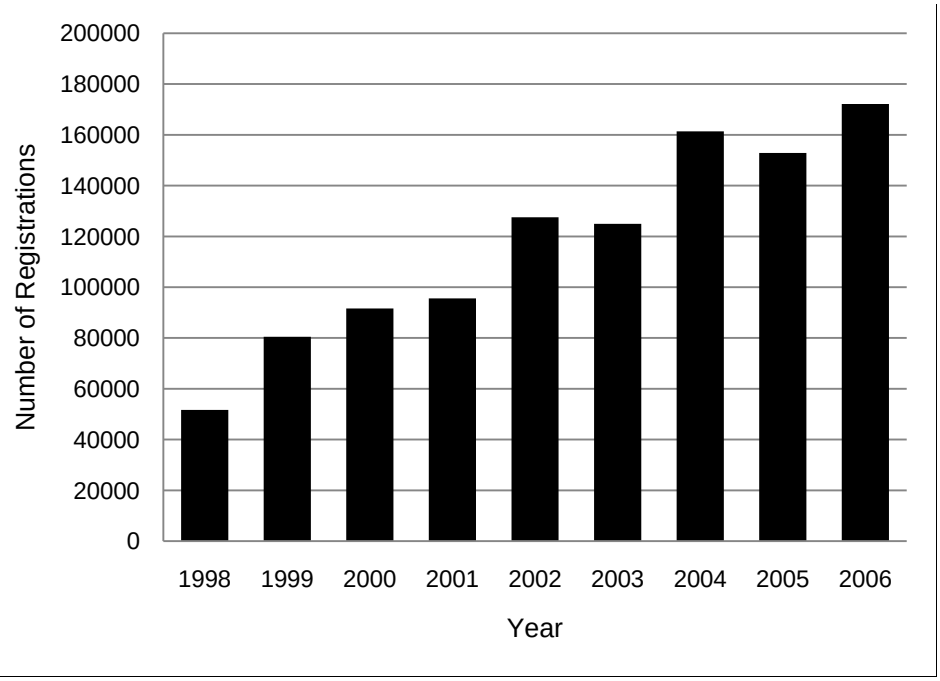

Figure 1. Off-highway vehicle registrations in Utah.

Note. These registration numbers are for all OHVs, *excluding* snow machines.

Source. Utah Department of Motor Vehicles, personal communication via e-mail, March 2007 (see Appendix A).

looping trail systems allowing the OHV user to experience a broad range of topographies. Being privy to such vast recreational resources is undeniably a factor in the growth of the activity within Utah that may not be so apparent in other parts of the country. The second reason OHV growth in Utah may be perceived as different from the rest of the nation is that Utah has a larger than average family size; 3.56 persons per family compared to the national average of 3.20 (U.S. Census Bureau, 2008). This is important because OHV activity is often portrayed as a family activity (Iowa OHV, 2008). Rather than being the pursuit of the activity itself, as many recreational activities are, OHV owners may participate in the activity to fulfill more social needs. Owners may see participation in the activity more of a means to gather family and friends. This hypothesis will be

explored further in the literature review of leisure motivations, but the idea is important to note because it may account for some of the activity's growth within the state.

Consequences of Growth in Utah

With the number of registered vehicles increasing every year and certain heavily visited areas having access reduced due to a variety of reasons (Group Challenging OHV Restrictions, 2007), many land managers and former managers have identified OHV use as reaching a "crisis stage" (Fahys, 2007). They claim the poor management of OHV use within the state has led to "rude and threatening treatment of land officials, destruction of ecologically sensitive areas, [a] refusal to stay on trails and damage to streambeds [caused by a] lack of enforcement of rules and regulations" (Fahys).

The massive growth of OHV use has undoubtedly placed current land managers in the role of dealing with a host of consequences, not the least of which is managing for an expanding and politically powerful type of recreationist that needs to be considered in future planning and policy guidelines. To better understand these users, their attitudes, motivations, and use characteristics, recreation managers can and often do turn to recreation research and social science for guidance and information.

Social Science and OHV Management

Social Science and Outdoor Recreation Resource Management

The management of recreation resources has evolved considerably over the past half century due to the availability and advancement of scientific knowledge about leisure and recreation (Moore & Driver, 2005). The advancement of social science research in

the field of recreation resource management has allowed for federal, state, and local land management agencies to develop policies that are informed by a more accurate understanding of the recreationist. Through an understanding of outdoor recreationists, their values, opinions, attitudes, differences, and similarities, recreation managers are able to provide for recreational opportunities in a more effective, efficient, cost-effective, responsive, and accountable manner while being able to provide better protection of basic natural and cultural/heritage resources.

Social Science and OHV Management

While OHV use is one of the key issues facing land management agencies in the U.S., it has received little attention from leisure researchers and sociologists (Bosworth, 2004). This fact is changing as increasing pressures have prompted land management agencies to direct increased attention and funding toward social science based research and management. The academic attention given to OHV use has traditionally been focused on the ecological impacts of OHVs. Not until recently has more notice been given to the economic impact of the activity, to the differences between OHV users and other recreationists, and to the differences within the OHV user group itself.

Just as social science can and has informed outdoor recreation management in the past, it now can be utilized to assist managers in addressing OHV use and the many consequences of its growth. This is the goal of this thesis: to provide an accurate picture of OHV recreationists in Utah so policies and future management can make more informed decisions effecting policy.

Objectives

To accomplish this goal, the thesis examines recreational OHV participation and ridership in Utah through three distinct processes. First, it attempts to define discernable differences among the state's OHV population, evaluating their level of recreation specialization within the activity. Secondly, it attempts to discern OHV owners' environmental attitudes and motivations for participation in the activity through the application of established and appropriate scales. Finally, it attempts to delineate differences in the owners' environmental attitudes and motivations based on their previously established specialization level within the activity. The acquisition of this information will fill a data gap created from the existing lack of knowledge about OHV recreationists in the state and from the general lack of existing data on the social characteristics of OHV owners. More broadly, it will also further the understanding of OHV activity and its users beyond the scope of Utah, as results will carry implications for land managers and policy makers who deal with issues involving recreational OHV use and public lands.

Specialization and Utah's OHV Owners

By analyzing OHV use through the conceptual recreation specialization framework created by Bryan (1977) researchers may be able to better understand within-group differences. Conclusions can also be drawn regarding the applicability of the framework to more modern recreational activities like OHV use. Inferences as to why the application was successful or not and the implications for further use of the

framework to analyze within-group differences among other recreational activities will be given.

Environmental Attitudes and Utah's OHV Owners

While research on public perceptions of environmental issues has grown in the past several decades, one specific area has remained sparse. That is the study of environmental attitudes among outdoor recreation groups (Nord, Luloff, & Bridger, 1998). This area of research may hold promising insights however, as recreation resource managers are constantly searching for more information about the attitudes and values of outdoor recreational groups with the goal of better managing the resources upon which their activities rely.

The environmental attitudes and behaviors of OHV users is a particularly neglected topic that is of specific relevance to resource managers, recreation planners, and recreation researchers. It serves three primary functions: first, it furthers the understanding of the connection between involvement in outdoor recreation and levels of environmental concern; second, it broadens the knowledge about OHV users and the commonly held perceptions about them; lastly, it allows land managers to better understand the potential acceptance of new OHV regulations and policies.

Motivations and Utah's OHV Owners

Studying the motivations for leisure, especially in outdoor recreation settings, has become a key component for federal land management agencies in their management strategies (Moore & Driver, 2005). With knowledge about why individuals engage in

leisure, recreation researchers and managers can better understand what people are seeking through their recreational pursuits (Manfredo, Driver, & Tarrant, 1996).

A key focus of this thesis is to understand how basic motivations and psychological outcomes differ among OHV owners in Utah. With an improved understanding of these differences, managers will be able to make more informed decisions regarding the management of OHV recreation resources. Examples of its application cover a wide array of planning and management tasks. These include: the identification of areas throughout the State where demand for these opportunities may be outpacing supply, the development of management objectives, the physical separation of developed recreation resources to avoid potentially conflicting motivational goals, and the identification of other recreation pursuits that may be substitutes for OHV riding.

Thesis Outline

Chapter II provides a review of the literature on the three theoretical concepts being employed: recreation specialization, environmental attitudes, and leisure motivation. Specific consideration is given to these theories' applicability in the management of outdoor recreation resources and more specifically, in the management of OHV use in Utah. Chapter III outlines the methods to be utilized. First, the research methodology is thoroughly explored followed by information regarding the statistical processes that will be employed. Chapter IV describes findings and provides brief commentary on their relationship to expected results. Finally, Chapter V explores the management and theoretical implication of the findings while making inferences to future research needs.

CHAPTER II

LITERATURE REVIEW

Recreation Specialization

Introduction

For nearly a century, there has been a need among the natural resource and recreation management community to better understand the users of the nation's public lands. This stems from the realization that effective and efficient policy, management, administration, and planning requires a thorough inventory and evaluation of both the biophysical *and* human dimensions of any given system. More explicitly, public lands managers should know who recreationists are and why they are visiting public lands if they are to provide benefits to those people (Government Performance and Appraisal Act, 1993).

As implied, the focus of recreation resource management has gradually evolved from a basic understanding of what types of recreational activities were occurring and where they were occurring. Modern recreation resource management strives for a broader understanding of who the recreationists are (i.e., how they define themselves, how recreation affects their lives, how they differ from other recreationists, and why they are participating in an activity). Recreation research has followed suit, with a large body of outdoor recreation literature attempting to define and better understand resource use from the perspective of the individual.

Understanding resource use at the individual level soon led researchers to look into differences among recreationists within activity groups. The publication of *Leisure*

Value Systems and Recreational Specialization: The Case of Trout Fishermen (Bryan, 1977) created a conceptual framework through which these within-group differences can be analyzed. Bryan's framework attempts to define the recreationists' role within an activity in order to place them along a continuum of use from the general to the particular (Bryan). At its core is the idea of creating a metric by which a recreationist's level of involvement or 'value' toward a particular activity can be measured.

The Origins and Core of the Specialization Framework

The conceptual framework of recreation specialization was initially used to analyze within-group differences and conflicts between trout fishermen in the Northern Mountain West. The conceptual framework was developed because of observational analysis of "conflicts within groups, particularly trout fishermen, as they clashed among themselves over the appropriateness of 'catch-and-release' and 'fly-fishing only' regulation, stream etiquette, and a host of other issues" (Bryan, 2000, p. 18). "These [conflicts] seemed to be related in some way to how long and intensely anglers had been involved in the sport" (Bryan, pp. 18-19). This relationship was attributed to the fishermen going through a "career stage" process, meaning there was a change in perspective related to how deeply and temporally engaged in the sport they were (Bryan, p. 19). This is the core to understanding and applying the recreation specialization framework; it must be understood that specialization *is a measure of engagement* in an activity. The level of engagement is simply referred to as the specializations dimension.

Those individuals most intensely involved in an activity define their self-concepts through that leisure activity (Roberts, 1970). The concept of leisure activities defining

self-concepts and worldviews is supported by dominant theoretical perspectives in the social and behavioral sciences (Bryan, 2000). At the time the specialization framework was developed, the concept of leisure value systems defining worldview was a relatively emerging area in recreation research. DeVall (1973) was the first to apply the concept to leisure activities only several years prior. In essence, Bryan's conceptualization of specialization allowed researchers and managers to better understand the behaviors and attitudes of recreationists and more importantly, how those behaviors and attitudes differed within a group of recreationists.

Specialization's Application to OHV Use

The background and origins of the specialization framework are of prime importance when making an effort to apply the conceptual framework to OHV use in Utah. This is because without an understanding of the purpose for which the concept was developed, re-application would prove to be purely an academic exercise, having no bearing on any relevant aspect of wildland recreation management.

Bryan's framework was developed to explain within-activity differences and conflict. Therefore, within-activity differences should be an assumed outcome if the specialization framework is to be applied, meaning OHV owners should observationally exhibit heterogeneous characteristics such as differences in skill or knowledge about the activity. Bryan also points out the easily observable fact there is an association between recreationists' values relative to their time in and commitment to an activity. First, the existence of intra-group differences must be a plausible likelihood, and second, the

variability of users should be dependent upon their time within and attachment to OHV use.

Popular literature and media exposure has often focused on OHV users' conflict with management or other user types. Little is known about the differences within the user groups themselves. But as with nearly all recreational activities, intra-group differences are sure to exist at some level. This thesis hypothesizes that because the specialization framework has been applied to a host of other recreational activities (See Appendix B) and discerned differences within various types of groups, OHV use should be no different. Differences between users within the activity should become apparent. With regard to the variability of users dependent upon their time within and attachment to OHV use, it is hypothesized this association exists within the community of OHV users.

With the two criteria met for application of the recreational specialization framework, re-application of the framework seems reasonable to help define within activity differences among OHV users in Utah.

The Recreational Specialization Framework

Bryan refers to the term "recreational specialization" as "a continuum of behavior from the general to the particular, reflected by equipment and skills used in the sport and activity setting preferences" (1977, p. 175). The term specialization was chosen because Bryan was struck by the sophisticated techniques and equipment certain advanced recreationists used and how they adapted their techniques or equipment to suit resource conditions (Scott & Shafer, 2001). The word *specialized* effectively describes the technical mastery and commitment displayed by a recreationist. The term *specialization*,

as noted by most of the literature, has taken on a more distinct meaning, most likely because of its common use in the everyday lexicon where it means to "train in or devote oneself to a particular area of study" (Hanks, 1979, p. 1397).

As noted before, the principal of specialization is that there is a connection between the degree of importance a recreationist gives to different activity and resource management components relative to his/her level of investment in an activity. This fact is at the core of the concept of recreational specialization; it maintains that recreationists "can be arranged along a specialization continuum which is linked to [their] technique and setting preferences as well as their behavior (Bryan, 1977, p. 176). The specialization framework links all of the preferences for engaging in an activity (e.g., technique, equipment, settings, and motivations) as well as individual behavior to an abstract concept, specialization, that is still very tangible.

The concept of specialization may be quickly identifiable with recreationists. It's not a stretch to conceptualize nearly any individual recreationist or recreational group in term of varying levels of involvement and commitment to the activity. The framework's most important function is that it gives researchers and natural resource managers a better way to understand differences within user groups via empirically grounded data, rather than primarily relying on prevailing assumptions.

Dimensions of Specialization

Specialization is intended to be a collective measure of the degree of importance an individual gives to different activity and resource management components. This is accomplished through measuring a host of individual characteristics and activity

preferences. These characteristics and activity preferences have evolved, throughout the history of specialization research (see Appendix B). It's generally agreed that the framework is multi-dimensional, being a product of behavioral (physical actions), cognitive (knowledge), and psychological dimensions (Scott & Shafer, 2001). Some research however, has conceptualized specialization as solely a behavioral construct (Ditton, Loomis, & Choi, 1992; Donnelly, Vaske, & Graefe, 1986; Martin, 1997) or as wholly psychological (McIntyre, 1989; Shafer & Hammitt, 1995). For the purposes of this thesis, specialization will be constructed through a combination of behavioral, cognitive, and psychological measures.

Scott and Shafer (2001) reiterate that beyond the recognition that recreation specialization includes a set of behaviors and attitudes, there is little agreement about how to characterize the construct. Leading researchers in the field now view specialization as a function of three measurable components: the recreationists' behavior, their skills and knowledge about the activity, and finally their commitment, the latter two of which represent the cognitive and psychological dimensions respectively (see Figure 2) (Needham, Vaske, Donnelly, & Manfredo, 2007; Scott & Shafer, 2001).

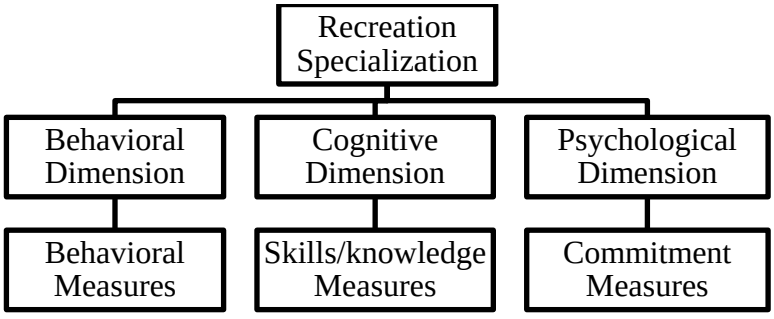

Figure 2. Dimensions and measures of recreation specialization.

Note. As conceptualized by Scott & Shafer, 2001

The measurement of behavioral, cognitive, and psychological dimensions is not a well established process and has been conducted in a wide variety of ways. New researchers tweak and make their own interpretations on how to measure the different dimensions. This variety can be attributed to an uncertainty surrounding the content validity of the measurement variables being used. Content validity refers to the measures representing all the aspects of [recreation specialization's] conceptual definition (Neuman, 2006). Variations in past research can also be attributed to doubt regarding what comprises the dimensions themselves and whether specific measures reflect one dimension or another (Kuentzel & McDonald, 1992). To date, there have been numerous ways assembled to measure specialization, including both empirical and theoretical variables, many of which overlap in their purpose of measurement. Appendix B presents a comprehensive list of the different measures used to assess the different dimensions and in turn specialization as a whole. It may prove useful in establishing survey questions for future empirical research into the topic. Appendix B also presents a chronological history of the evolution of recreation specialization literature, with notice given to the activity being analyzed, variety of dimensions measured, and the individual measures used.

Measuring Specialization in OHV Use

The dimensions of specialization used for this thesis, behavior, skills/knowledge, and commitment, were adopted from Scott & Shafer (2001), as they are now fairly well accepted in the literature (e.g., Needham et al., 2007; Oh & Ditton, 2006; Thapa, Graefe, & Meyer, 2006).

Behavior, by far the most frequently repeated measure of an individual's specialization level, can be measured by soliciting information about the frequency or absolute number of trips an OHV owner has taken. The idea being that more specialized or involved recreationists will participate more frequently than those who are not. Utah OHV owners will be asked the total number of trips they have taken within the past year (Lee & Scott, 2006; Oh & Ditton, 2006; Thapa et al., 2006). Behavior is also frequently measured by the years a recreationist has participated in an activity. Logically, more specialized recreationists are believed to have participated in the activity for relatively longer periods of time. Recent research (Needham et al., 2007) has controlled for the age of the recreationist (i.e., dividing the years a recreationist has been involved in the activity by their age). Prior research did not complete this step which may have inadvertently biased the continuum of specialization groups, placing older recreationists in more specialized groups. This thesis will control for age, again for the logical reasoning of reducing the tendency of older owners to be placed in the more specialized groups. OHV owners will be asked the number of years they have been riding OHVs as well as the year in which they were born. From these two measures, a third variable can be created, percentage of life spent riding.

Equipment and investment is frequently treated as a smaller component of the larger behavior dimension (e.g., Bricker & Kerstetter, 2000; Chipman & Helfrich, 1988; Kuentzel & McDonald, 1992). Equipment and investment measures are a logical component to measure a recreationist's level of commitment and involvement within the activity. Bryan (1977, 1979) originally hypothesized that more specialized recreationists would prefer specific types of equipment that allowed them to participate in the activity

in the way they desired. Applied to OHV use we can hypothesize that the most involved OHV owners are likely to own more equipment and to have invested more in the activity throughout their lifetimes. Due to this, five variables will be utilized to measure equipment and investment in the activity. These variables are: the total number of vehicles owned (see Bricker & Kerstetter, 2000; Dyck, Schneider, Thompson, & Virden, 2003; Hvenegaard, 2002; Kuentzel & Heberlein, 2006; Miller & Graefe, 2000; Schroeder, Fulton, Currie, & Goeman, 2006); the amount spent on purchasing OHVs within the past 12 months (see Cole & Scott, 1999 and Wellman, Roggenbuck, & Smith, 1982); the amount spent on miscellaneous expenditures within the past 12 months (see Cole & Scott, 1999 and Wellman, Roggenbuck, & Smith, 1982); the lifetime expenditures on OHV related equipment and activities (see Bricker & Kerstetter, 2000; Dyck et al., 2003; Hvenegaard, 2002; Needham et al., 2007; Schroder et al., 2006); and finally the amount spent on support equipment (equipment purchased exclusively for OHVs) within the past 12 months (see Bricker & Kerstetter, 2000; Dyck et al., 2003).

Skill/knowledge, the next primary dimension of specialization, has seen much less variability in the ways it has been measured (see Appendix B). By far the most common measurement of this dimension is the self-assessed skill level of the recreationist (see Dyck et al., 2003; Kuentzel & Heberlein, 2006; Lee & Scott, 2004, 2006; McFarlane, 2004; Miller & Graefe, 2000; Needham et al., 2007; Oh & Ditton, 2006; Oh, Ditton, Anderson, Scott, & Stoll, 2005; Salz & Loomis, 2005; Salz, Loomis & Finn, 2001; Scott, Ditton, Stoll, & Eubanks, 2005; Thapa et al., 2006). Little justification is needed here for the inclusion of this variable in a measure of specialization. The more specialized OHV owner will see themselves as more skilled in their riding abilities relative to other riders.

This thesis will utilize the self-identification of skill as well as a measure of the OHV owners' preference for trail difficulty. Preference for trail difficulty is included because it solicits information about specific activity related abilities (see Burr & Scott, 2005; Dyck et al., 2003; Lee & Scott, 2004, 2006; Martin, 1997; Scott & Thigpen, 2003; Thapa et al, 2006). More specialized owners are assumed to prefer more difficult trail settings than less specialized owners.

The final dimension of specialization, commitment, has been measured through a host of variables geared toward assessing the affective relationship, meaning the psychological and emotional connection that OHV owners have with the activity. Specialization researchers have frequently utilized the idea of commitment as a gauge of this relationship, either through questions concerning continued participation in an activity or the role that the activity plays in the recreationists' life (i.e., how central it is to their lifestyle). The commitment dimension is arguably the most vague among the three modern tenants of specialization research. For the purposes of this thesis, commitment has not been given the central focus, an admitted weakness.

Commitment will be measured through the concept of centrality, a subcomponent of the broader commitment dimension (see Appendix B). *Centrality to lifestyle* assumes the more central the activity is to recreationists' value systems, the more it defines their self-perceptions and in turn, the more specialized they are. One frequent variable used to measure this dimension is whether or not a recreationist is a member of a voluntary association group centered around the activity (e.g., OHV owners may be member of a local riding club or members of the Blue Ribbon Coalition, a national OHV access advocacy group) (see Miller & Graefe, 2000; Oh & Ditton, 2006; Oh et al., 2005; Scott et

al., 2005; Thapa et al., 2006). This thesis will utilize this variable as well as another geared to measure an OHV owners' level of involvement with the activity.

The second variable concerns whether the respondent takes routine annual trips to a particular place for a particular reason. For example, an OHV owner may travel every year to Little Sahara Recreation Area in Central Utah over Memorial Day weekend for a family reunion. I hypothesize that this variable poses just as good a measure of involvement as membership in voluntary association groups. That being said, these two measures in no absolute way provide a comprehensive view into the affective dimension of OHV riding. Other measures revolving around the relationship of the activity to other areas of life would undoubtedly prove to be more comprehensive and applicable to measuring an individual's specialization level. Due to the constraints of survey development however, they have not been included in this thesis. If future research should continue to examine specialization among OHV owners further, it should provide adequate and ample attention to the psychological component of participation in the activity.

The Continuum of Specialization

Based on questions that inquire about both recreationists' past actions as well as their "beliefs, attitudes, values, and ideologies connected with the [activity]" (Bryan, 1977, p. 178) a systematic classification of user types can emerge. This is the continuum of specialization. It involves the organization of unique and separate classes of participants within the activity. The classes range from the occasional recreationists to the most specialized users. Occasional recreationists are typically defined as "those who

[participate in the activity] infrequently because they are new to the activity and have not established it as a regular part of their leisure, or because it simply has not become a major interest" (Bryan, p. 178). The next group along the continuum are generalists, they are portrayed as recreationists "who have established the sport as a regular leisure activity and use a variety of techniques" (Bryan, p. 178). Next are the technique specialists, who can best be described as individuals who specialize in a particular method of participation within the activity, largely to the exclusion of other methods. The final group along the continuum is technique setting specialists. They can be defined as highly committed individuals who specialize in a particular method and have distinct preferences for specific recreational settings. Recreationists are thought to progress from one end of the continuum to the other as their time spent participating in the activity increases (Bryan). Many applications of the specialization framework to a variety of recreational activities (e.g., Ewert & Hollenhorst, 1994; Shafer & Hammitt, 1995; Virden & Schreyer, 1988) have yielded very similar classification systems.

Review and analysis by Scott and Shafer (2001) of specialization classification systems has identified three general stages of involvement. First is the novice or beginner stage; individuals in this stage are likely to participate infrequently and "are intent on getting results, any results" (Bryan, 1979, p. 87). A second stage includes individuals for whom the activity has become an established behavior. During this establishment phase recreationists are assumed to develop their level of competence and seek to validate their skill through greater challenges. The third stage of involvement entails a high degree of commitment, activity related knowledge, financial involvement, and a focus in behavior. This categorization is notably similar to that presented by

Stebbins' (1982, 1992) research into career stages. He identified five career stages that broadly define the arc of an individual's recreational or leisure pursuits. The three typologies of involvement levels noted above are outlined in Table 1 on the following page.

Progression over Time

An individual's specialization level should not be conceived of as a static concept, rather recreations flow through the continuum over time. This position requires that we search for a better understanding of how an individual's behavior, skills and knowledge, and commitment vary over time. Recreational activity has long been viewed as a lifelong process (Kelly, 1974). Kelly advocated participation be viewed from a "developmental approach" (p. 181). This developmental approach is congruent with Bryan's intent that an individual's movement along the specialization continuum was based in behavioral principles (Bryan, 2000). He notes that progression or "sustained involvement in an activity is fueled by a 'just right' reinforcement schedule of success and recognition," and "the 'push' to specialize comes from a continual seeking of new challenges and solutions" (Bryan, p. 19).

Table 1

Three Models for Analyzing Stages of Involvement

Model	Casual stage	Intermediate stage	Advanced stage
Hobson Bryan's recreational specialization framework (1977)	Occasional	Generalists	Technique Specialists / Technique Setting Specialists
Scott and Shafer's general stages of involvement (2001)	Novice or beginner	Establishment	Specialization
Stebbins' serious leisure and career stages framework (1982, 1992)	Beginning / Development	Establishment / Decline	Maintenance

Bryan's portrayal of progression suggests that individuals move from a general to a more particular level of involvement, with progression directly related to a temporal variable. That is, the longer people are engaged in an activity, the more specialized they become. This may not be the case, as no panel studies have been undertaken to test systematically whether or not people progress over time (Scott & Shafer, 2001). In fact two studies have found that there is little or no correlation between years of experience and progression (Donnelly et al., 1986; Kuentzel & Heberlein, 1997). Further research

has supported the fact that an individual's specialization level does not increase in a linear fashion over time (e.g., Scott & Godbey, 1994). Many recreationists may reach a plateau in terms of how far they progress along the specialization continuum (Kuentzel & McDonald, 1992). This finding would support the frequent observation of larger numbers of individuals at the lower end of the specialization continuum (Bryan, 1979). The idea that behavior, skill, and commitment are not strongly related to the amount of time an individual spends participating in an activity is also supported by more recent findings that many, if not most [recreationists], do not seek to progress toward a level of specialization that requires higher levels of time and financial commitments (Scott & Godbey). Movement within the specialization framework is more likely to be described as a steady to erratic oscillation that is dependent upon many outside variables such as family, career, and proximity to recreational resources, among others. This is best summarized by Scott and Shafer:

> Although some people certainly progress (and some to an elite status), most probably either maintain involvement at a relatively fixed level or actually decrease their participation over time. It is also likely that many people have little inclination to progress toward the so-called elite end of the specialization continuum, and, in some cases, may actually resist skill development and mimicking the attitudes and behaviors of so-called specialists. (p. 319)

Conclusion

To summarize, segmenting users according to behavior, skills and knowledge, and level of commitment to the activity can serve as a tool to recreation managers by allowing more effective planning for the needs of smaller more homogenous groups. The recreation specialization framework attempts to accomplish this by evaluating the

intensity of involvement with which a recreationist engages an activity (Bryan, 1977, 1979). The framework laid the foundation for subsequent explorations of within-activity differences. It has also fueled dialogue about the dynamic change which occurs in the degree of importance recreationists give to different management and activity approaches (i.e., their values) over time. Wholly, the specialization framework can serve the dual purpose of providing the natural resource manager with empirical data enabling specific types of users to be partnered with the most appropriate resources (Bryan, 1977) as well as providing to the social scientist a framework from which the processional stages of engagement in an activity can be analyzed.

Environmental Attitudes

Introduction

Concern about the environment has grown over the last half century as pressure has increased on the use of U.S. natural resources (Cottrell & Graefe, 1997). While no single cause can be attributed to the emergence of attitudes that are ecologically centered, many texts cite the publication of Rachel Carson's *Silent Spring* in 1963 as the catalyst for the cascade of environmentally driven ideas that followed.

The emergence of concern over environmental issues spawned new research aimed at better understanding environmental concerns. Many studies during this period focused on the emergence and acceptance of attitudes centered on the environment (Dunlap & Jones, 2002; Schnaiberg, 1973; Van Liere & Dunlap, 1980, 1981). Studies also focused on the general public's environmental concern (Albrecht, 1975; Gale, 1972; McEvoy, 1972; Morrison, Hornback, & Warner, 1972). Academic researchers soon

began to delve beyond the ecological causes and consequences of environmental degradation and started to look at the social forces that led to the existing state of the natural environment.

Social and Environmental Paradigms

Disch (1970) argued that our nation's ecological problems stem in large part from the traditional values, attitudes, and beliefs prevalent within society. The framework was soon expanded upon by Pirages and Ehrlich (1974), who argued society's values, attitudes, and beliefs comprise what is called the "Dominant Social Paradigm" (DSP). The DSP, they contended, constitutes a worldview "through which individuals, or collectively a society, interpret the meaning of the external world" (Pirages & Ehrlich, p. 43). These authors further define the DSP as "a mental image of social reality that guides expectations of a society" (p. 44). Pirages and Ehrlich believed that the DSP of the U.S. society in the late 1960s and early 1970s was largely ignorant of ecological ideas and concepts; so much so that they advocated for individual and institutional change (Pirages, 1977).

Whether through the influence from Pirages and Ehrlich or other global societal motivators, like the *Torrey Canyon* oil spill of 1969 or the 1974 UN Conference on the Human Environment, U.S. society began to become increasingly aware of the consequences of environmental degradation. New ideas began to emerge that signified a shift away from the DSP. Dunlap and Van Liere (1978) classified these new ideas into three broad categories: the support for limits to growth, the idea that there is a balance of nature, and the emergence of anti-anthropocentric ideas. They termed the assemblage of

these ideas the "New Environmental Paradigm" (NEP). Dunlap and Van Liere soon developed a scale upon which individual, group, or societal support for the NEP could be measured.

The NEP Scale

The NEP scale as proposed by Dunlap and Van Liere (1978) asks respondents to state their level of agreement[2] with 12 statements; the scale was later revised including three more statements bringing the total to 15 (Dunlap, Van Liere, Mertig, & Jones, 2000) (Table 2). These statements are aimed at measuring five latent dimensions (three questions each): limits to growth, anti-anthropocentricism, balance of nature, anti-exemptionalism, and a belief that an ecological crisis is imminent. The dimensions, taken as a whole are intended to be a representative measure of an individual or group's "proenvironmental orientation" (Dunlap et al., p. 425).

The NEP scale quickly became a widely used tool and since has been reinterpreted by many different social scientists (Cotgrove, 1982; Milbrath, 1984; Olsen, Locwick, & Dunlap, 1992). Dunlap et al. (2000) contend that any reiterations or reinterpretation of the original scale, while potentially being more comprehensive, easily became "unwieldy" (p. 427). Regardless of these subsequent iterations, the NEP scale remains a widely used measure of environmental or as Dunlap et al. re-coined the term after their own modifications, *ecological* worldview.

[2] Respondents state their level of agreement on a 5-point Likert scale where 1 = *strongly disagree* and 5 = *strongly agree*.

Table 2

The New Ecological Paradigm Scale (Dunlap et al., 2000)

Dimension	Statement
Limits to Growth	We are approaching the limit of the number of people the Earth can support.
	The earth has plenty of natural resources if we just learn how to develop them.[b]
	The Earth is like a spaceship with very limited room and resources.[a]
Anti-Anthropocentricism	Humans have the right to modify the natural environment to suit their needs.[b]
	Plants and animals have as much right as humans to exist.
	Humans were meant to rule over the rest of nature.[b]
Balance to Nature	When humans interfere with nature, it often produces disastrous consequences.
	The balance of nature is strong enough to cope with the impacts of modern industrial nations.[b]
	The balance of nature is delicate and easily upset.

(table continues)

Dimension	Statement
Anti-Exemptionalism	Human ingenuity will insure that we do not make the Earth unlivable.[b]
	Despite our special attributes, humans are still subject to the laws of nature.
	Humans will eventually learn enough about how nature works to be able to control it.[b]
Ecological Crisis	Humans are severely abusing the environment.
	The so-called "ecological crisis" facing humankind has been greatly exaggerated.[b]
	If things continue on their present course, we will soon experience a major ecological catastrophe.

[a] This statement was changed slightly for the purposes of this study to "The earth has a finite amount of room and resources" because it was believed likening the earth to a spaceship is an outdated metaphor. [b] These variables are reverse scored.

Dimensions of the New Ecological Paradigm Scale

As Table 2 displays, the NEP scale was developed around five dimensions thought to measure the strength of an individual's environmental orientation. These five dimensions were chosen based on the earliest environmental attitude literature (e.g., Dunlap, 1975; Weigel, Woolston, & Gendelman, 1977) as well as subsequent reiterations (see Dunlap et al., 2000). The limits to growth dimension attempts to assess an individual's perception of the limited availability of natural resources on the Earth and its

implications for human populations. The anti-anthropocentricism dimension tries to evaluate the extent to which an individual disagrees with the idea that nature exists primarily for human use and that it has no inherent value of its own. The third dimension, balance to nature, tries to measure support for the ecological concepts of resilience and resistance. Resilience is "the speed with which a[n] [ecological] community returns to its former state after it has been perturbed and displaced from that state" (Begon, Townsend, & Harper, 2006, p. 586), and resistance is "the ability of that [ecological] community to avoid displacement in the first place" (Begon et al., p. 586). The fourth dimension, anti-exemptionalism, assesses the extent to which individuals believe that humans' unique characteristics (e.g., written language, advanced social systems, the ability to rapidly and efficiently modify our natural environment) have "exempted" our species from ecological constraints. The final dimension, eco-crisis, deals indirectly with an individual's acceptance of relatively recent science on global climate change as a result of human actions (e.g., IPCC, 2007).

The majority of research utilizing the NEP scale concludes that three of the five dimensions exhibit strong multi-colinearity (e.g., Arcury, 1990; Corral-Verdugo & Armendariz, 2000; Noe & Snow, 1990; Scott & Willits, 1994; Tarrant & Cordell, 1997). The three dimensions most highly related are: balance of nature, limits to growth, and anti-anthropocentricism. This finding supports, at the theoretical level, using the NEP as measure of an individual's general environmental orientation.

Even though multiple dimensions often emerge, Dunlap et al. (2000) prefer to interpret the complete scale as a measure of general environmental attitude (e.g., Dunlap & Van Liere, 1978; see Figure 5, p. 77) rather than utilizing the dimensions around which

the scale was developed, "ad hoc dimensions that emerge from various factoring techniques" (Dunlap et al., p. 431). This thesis will follow suit and load all the measures of environmental attitude onto one factor.

Criticisms of the NEP Scale

The NEP is treated as a measure of an ecological worldview and as a representation of environmental attitudes, beliefs, and values (as noted earlier by Pirages and Ehrlich's DSP scale). Measuring the perceptions of individuals' connection with nature, the basic truths they hold about their role in physical and social reality is undoubtedly an ambiguous task. No measurement instrument suitable for broad social analysis could placate all of the unique perceptions and ideas inherent in measuring an environmental attitude. Consequently, many criticisms have been leveled at the theoretical underpinnings of the NEP scale. For example, it has been pointed out that the NEP is not grounded in social-psychological theories (Stern, Dietz, & Guagnano, 1995). It has also been noted theories of attitude structure caution against categorizing individual items as clean-cut indicators of attitudes or beliefs (Eagly & Kulesa, 1997), which the NEP does. Dunlap et al. (2000) have countered by arguing the statements within the NEP tap into "primitive beliefs about the nature of the earth and humanity's relationship with it" (p. 427). They receive support on this count from social psychologists who understand these "primitive beliefs" to influence a wide range of beliefs and attitudes relative to specific environmental issues (Gray, 1985). Despite the theoretical shortcomings of the scale, it has shown to be a very popular measure of pro-environmental attitudes among not only the general publics, but among specific sub-

populations (e.g., farmers, ethnic minorities, interest groups, and outdoor recreationists) as well.

Validity of the NEP Scale

Criterion validity is defined by Neuman (2006) as a "measurement validity that relies on some independent, outside verification" (p. 193). He expands, noting that criterion validity is measured by comparing the first measure with a second measure of the same construct in which the researcher has confidence (Neuman). Criterion validity can be supported by showing both known-group validity as well as predictive validity (Zeller & Carmines, 1980), both of which have been shown for the NEP scale.

Dunlap et al. (2000), in arguing for the criterion validity of the NEP scale, proclaim that it has a proven track record of discerning differences between known-groups. Known-group validity is support for a measure based on expected results that differ between known groups. For example, several studies have compared NEP scores of environmental organizations to the general public or members of non-environmental groups (e.g., Edgell & Nowell, 1989; Pierce, Steger, Steel, & Lovrich, 1992; Widegren, 1998). All of these studies have shown the environmental organizations scored higher on the scale relative to other groups.

Validity of the scale has also been ancillary supported by showing a relationship between environmental attitudes and behavioral intentions, self-reported behavior, and observed behavior (predictive validity) (Blake, Guppy, & Urmetzer, 1997; Cordano, Welcomer, & Scherer, 2003; Ebreo, Hershey, & Vining, 1999; O'Connor, Bord, & Fisher, 1999).

Outdoor Recreation and Environmental Concern

Concurrent with the rise in awareness of environmental issues has been the increasingly important role that outdoor recreation has come to play in Americans' lives (Hammitt & Cole, 1998; Manning, 1999; Wellman & Propst, 2004). Their parallel histories suggest there may be a connection between involvement in outdoor recreation and environmental concern. The causal mechanisms for such a connection have been explored briefly in the previous literature (Dunlap & Heffernan, 1975; Geisler, Martinson, & Wilkening, 1977; Pinhey & Grimes, 1979). Dunlap and Heffernan posed the hypothesis that

> involvement in outdoor recreational activities creates an awareness of environmental problems by exposing people to instances of environmental deterioration, [therefore] creat[ing] a commitment to the protection of valued recreation sites; and, also, cultivat[ing] an aesthetic taste for a "natural" environment which fosters a generalized opposition to environmental degradation. (p. 18)

The study of this hypothesis (Dunlap & Heffernan, 1975; Geisler et al., 1977; Pinhey & Grimes, 1979), however, has received poor to mixed support and appears to have been dropped from the empirical examinations of outdoor recreationists' values, attitudes, and beliefs. Given the rise of participation in outdoor recreational activities over the last 30 years (Hammitt & Cole, 1998; Moore & Driver, 2005), and the important implications that the knowledge could have on the management of recreation resources, it may prove wise to revisit this hypothesis and see if the results obtained by researchers in the late 1970s still hold true. However, it is beyond the scope of this thesis to examine

any causal connections between participation in outdoor recreation and environmental attitudes as only a specific user group will be examined.

Differences by Recreation Type

In addition to the potential connection between participation in outdoor recreational activities and environmental concern, differences between specific activity types could have more salient implications for both the efforts to manage recreational resources and the efforts to understand between-group differences. Previous research has examined the environmental behavior and concerns of particular outdoor recreation participants, but the results have been mixed (Schuett & Ostergren, 2003). For example, Dunlap and Heffernan (1975) found participants in appreciative outdoor activities (e.g., hiking, camping, and photography) had a higher level of environmental concern than participants in consumptive outdoor activities (e.g., hunting, fishing). These early studies did not compare specific user groups based on different outdoor recreational activities; instead they focused on activity types (i.e., comparing consumptive, appreciative, and motorized, rather than comparing specific activities).

Environmental Attitudes of OHV and Motorized Recreation Participants

There is a paucity of research that looks into the values, attitudes, and beliefs of OHV users. Consequently, little is known about these recreationists' environmental attitudes. The only literature available that is of ancillary importance has involved the broad spectrum of motorized recreationists. In 1987, Jackson assessed views on resource development and preservation of several specific types of outdoor recreation participants.

He surveyed cross-country skiers and hikers (appreciative behavior), anglers and hunters (consumptive behavior), as well as motor boaters and snowmobilers (motorized behavior). Results showed participants in the appreciative activities held a stronger preservationist orientation than participants in consumptive (except hunters) and motorized activities, who held a stronger pro-development view (Jackson, 1987). Similarly, Nord et al. (1998) found participants in motorized recreation activities were less likely to be environmentally active (e.g., contributing money or time to an environmental organization) than participants in non-motorized outdoor activities. Finally, Schuett and Ostergren (2003) found motorized recreationists expressed relatively less environmental concern and less involvement with environmental organizations when compared to mountain bikers.

Inherent Bias?

The use of the NEP scale to measure OHV users' environmental attitude may harbor some inherent bias due to the fact that the NEP scale refers implicitly, if not directly, to an individual's trust in science, technology, and human ingenuity. This may pose a threat to the validity of the findings because participation in the activity requires the purchase of a fairly technologically sophisticated vehicle designed to travel off-road (i.e., some a priori belief in the power and appropriate use of science, technology, and engineering is inherent in the sample population).

Conclusion

To summarize, the NEP scale has shown to be a very popular measure of pro-environmental attitudes among a variety of populations. Despite its theoretical

shortcomings, it will serve as an appropriate measure of environmental attitudes of OHV owners. Understanding these attitudes has important implications for managers of natural and recreational resources (Schuett & Ostergren, 2003) as they are constantly searching for more information about the values, opinions, and beliefs of outdoor recreational groups. Unfortunately however, previous study on the environmental attitudes of motorized recreation groups remains sparse (Nord et al., 1998). By examining the environmental attitudes of OHV users, this thesis will further the understanding of the connections between involvement in outdoor recreation and levels of environmental concern. It will also broaden the knowledge about, and commonly held perceptions of, OHV users. Finally, it will allow land managers to better understand the potential acceptance of new OHV regulations and policies among users. For example, if positive levels of environmental awareness are found among the OHV community, public outreach campaigns that teach responsible riding and respect for natural resources may be more successful than previously thought.

Leisure Motivations

Introduction

Recreation researchers and practitioners have focused on the motivations for leisure for several decades. It has become a topic of central concern in leisure research (Manfredo, Driver, & Tarrant, 1996). Motivations are important because they help determine why people engage in a behavior in the manner in which they do. These also assist in understanding the consequences of recreationists' decisions (e.g., whether they continue participation, adapt to new technologies, or decide to participate in the activity

elsewhere). The central application of motivations research has been that it enables managers to develop policies, rules, and regulations that have the greatest likelihood of minimizing conflicts between users and yielding beneficial outcomes for recreationists and agencies (Manfredo et al.).

Theoretical Underpinnings

The "experiential approach" is a particular line of motivations research that was introduced in the late 1960s by Driver and Tocher (1970) and was extended in a number of subsequent studies (Driver & Brown, 1978a; Driver & Knopf, 1977; Haas, Driver, & Brown, 1980; Knopf, Driver, & Bassett, 1973; Manfredo, Driver, & Brown, 1983). This approach assumes recreation participation is not pursued solely for the activity itself. Instead, recreation is conceptualized as a "psychophysiological experience that is self-rewarding, occurs during non-obligated free time, and is the result of free choice" (Manfredo et al., 1996, p. 189). Early conceptualizations of motivation theory in outdoor recreation (Driver & Tocher; Knopf et al.) suggested recreational activities are behavioral pursuits instrumental to attaining certain psychological and physical goals. These goals are achieved through a linear process beginning with a motivation to participate. Recreationists' motivations and preferences drive choices regarding activities, settings, and companions, which consequently determine the type of recreational experience they will have, whether or not they will achieve their goals, and the benefits they will achieve (Manning, 1999).

Early authors suggested people pursue engagements in recreation when a problem state exists (Manfredo, 1984; Wellman, 1979) or when an existing state does not match a

preferred state (Knopf et al., 1973). Recreationists realize this "problem state" and consequently engage in an activity that will provide them with an "intrinsic reward," that is, a positive change in the problem state (Iso-Ahola, 1980). Benefits and positive outcomes are achieved when their state has been bettered. A benefit of leisure can therefore best be defined as a "desirable change of state," an improved condition or state of an individual, a group of individuals, a society, or even nonhuman organisms (Driver, Nash, & Hass, 1987, p. 295). Prevention of a worse condition is also considered a benefit. Benefits have been classified into four types: personal, social, economic, and environmental (Driver, 1994; Lee & Driver, 1992). Personal benefits include those related to improved physical and mental health as well as personal growth and development such as cardiovascular benefits, reduced depression and anxiety, and improved self-confidence. Social benefits include items such as community pride, strengthened bonds with family and friends, and decreased delinquency. Increased productivity, reduced health costs, and local economic growth are examples of economic benefits. Environmental benefits include a stronger environmental ethic and benefits associated with ecosystem protection and health, such as species diversity and protection against loss of critical habitat.

Through the assumption that recreationists engage in use to achieve benefits, the recreation experience was defined from a psychological perspective as the "package" or "bundle" of psychological outcomes desired from a recreation engagement (Driver, 1976; Driver & Brown, 1978a; Driver & Knopf, 1976). The desired experiences, or motivations for participation, are the key explanation in understanding why people

engage in recreation and the benefits they want to achieve from participation in an activity (Manfredo et al., 1996).

Measuring Motivations

Research into leisure motivations since the mid 1970s has focused on the development of psychometric scales that can be used to measure a recreationist's desired experiences. These scales have become known as the Recreation Experience Preference (REP) scales (Driver, 1977, 1983). The development of the REP scales has focused primarily on identifying measures that could comprehensively represent the concepts of interest. Content validity,[3] internal consistency,[4] and applicability to management were often the central focus of REP scale development studies (Driver, 1983). Social-psychological and recreation fundamentals were also a top priority in scale development. To ensure a strong grounding in psychological theory and to achieve an acceptable level of validity, items were identified by reviewing the personality trait and motivation literature to determine the types of needs and motivations that might influence recreation (Manfredo et al., 1996). Items were then developed through "brainstorming or adaptation of existing psychometric scales that might measure these concepts. Item development was also achieved through considerable open-ended qualitative discussions of motives with recreationists and by reviewing the recreation literature" (Manfredo et al., p. 191).

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[3] Content validity refers to the measures representing "all the aspects of [recreation specialization's] conceptual definition" (Neuman, 2006).

[4] Internal consistency is usually measured through Cronbach's α, a statistic that measures the extent to which the empirical measures, combined to measure a latent construct, produce similar scores. In other words, it shows the extent to which OHV owners are consistently motivated (either in a positive or negative fashion) throughout all of the observed variables.

Subsequent groupings of items were tested and refined using cluster analysis to show they were empirically related (Driver, Tinsley, & Manfredo, 1991). After several refinements of these groupings, Driver (1983) published a comprehensive list of potential REP items that could be categorized into 19 domains.

Applications to Management

While the beneficial outcomes of recreation and leisure are becoming more widely documented, managing public lands for recreation benefits is a relatively new idea (Stein & Lee, 1995). The REP scales have served as empirical evidence used to further this agenda. The scales have been used to argue for recreation management that considers four levels of demand: settings, activities, recreation experience outcomes, and enduring personal and social benefits (Driver & Brown, 1978a). An understanding of the relationship between activities and recreational experiences spawned development of the Recreation Opportunity Spectrum (ROS) (Driver & Brown, 1978b; Brown, Driver, & McConnell, 1978). The ROS proposes a typology of recreation opportunities for recreation professionals to consider in planning and management. The application of REP scales to the development and widespread use of the ROS consequently prompted increased focus to be placed on the understanding and support for recreation that provided more than just activities, but experiences and benefits as well (Moore & Driver, 2005).

With a burgeoning understanding of the motivations for participation in and benefits derived from outdoor recreational pursuits, recreation resource management agencies have moved away from activity based management, which focuses on supply

considerations (Moore & Driver, 2005). The agencies have begun to widely adopt a more experientially based approach termed Benefits-Based Management (BBM) that views the major goals of management as being to promote realization of positive outcomes and avoidance of negative outcomes, while protecting and improving the basic biophysical and cultural/historic resources being managed (Driver & Bruns, 1999). BBM holds that desired benefits are the outputs around which recreation managers need to design management actions (Stein & Lee, 1995).

The key to implementing BBM is an understanding of how recreation managers can facilitate the realization of recreation benefits (Bruns, Driver, Lee, Anderson, & Brown, 1994). To provide opportunities for recreationists to achieve desired benefits, managers must have some knowledge of the relationship between recreational activity, desired beneficial outcomes, and to some extent recreational setting characteristics (Stein & Lee, 1995). The recreation activity-outcome-setting relationship has been the focus of a number of research efforts. Several studies have examined the relationship among activities and benefits in a variety of recreation environments (Manfredo et al., 1983; Virden & Knopf, 1989; Yuan & McEwan, 1989). These studies, as expected, have shown a relationship between visitor preferences for recreational experiences and activities.

Measuring Motivations for Participation in OHV Use

To measure visitor preferences for recreational experiences, respondents are typically asked to rate the desirability or importance of a list of potential benefits as a reason for participating in an activity. They are asked to rate them using a 5-point Likert

scale ranging from "not important at all" to "very important." The list of potential benefits is then typically analyzed using a method of hierarchical cluster analysis to reduce it into mutually exclusive benefit domains. These domains are usually similar to: stress relief/nature appreciation/fitness, share similar values, achievement/stimulation, learn new things, independence, improve mental well-being and sense of self, introspection, teach/lead others, and meet new people (Stein & Lee, 1995).

This thesis gathered information typical of any BBM or REP research as outlined above (Driver & Bruns, 1999; Stein & Lee, 1995). The domains measured (Table 3) were hand-selected from a comprehensive list of potential motivations (Canadian Parks/Recreation Association, 1997). The individual measures within those domains were then used to assess the preferences for recreational experiences of OHV owners in Utah.

The knowledge gained from assessing the desired outcomes of OHV owners will prove useful to managers of recreation resources in their development of plans for new facilities, their management of existing OHV areas, and their general knowledge base concerning recreationists' desires as "the sole purpose of all land management is to provide benefits for people" (Wagar, 1966, p. 9).

Table 3

Motivations for Riding

Dimension	Motivation
Stress relief and nature appreciation	Enjoy natural scenery
	Get away from the demands of life
	Experience personal freedom

(table continues)

Dimension	Motivation
Teach/lead others cont.	Lead other people
Stress relief and nature appreciation continued	Experience solitude Release or reduce built-up tension
Share similar values	Be with other people who enjoy the same activities that I do Be with members of my group
Achievement/stimulation	Do something challenging Enjoy a place that is special to me Experience excitement Develop my skills and abilities Test the capabilities of my vehicle
Learn new things	Experience new and different things Learn more about the natural history of an area
Independence	Do things my own way Be in control of things that happen
Teach/lead others	Help others develop their skills Share what I have learned with others
Meet new people	Talk to new and varied people Observe other people in the area

Note. From Canadian Parks/Recreation Association, 1997

CHAPTER III

METHODS

Survey Methodology

The research questions this thesis attempts to answer are concurrently theoretical and applied. Their analysis will produce empirical measurements that can further explain the patterns behind OHV owners' specialization level, their environmental attitudes, and their motivations for participation in the activity.

Methodological Justification

Mail surveys are a suitable methodological approach when trying to collect information about individual behaviors and characteristics. These are appropriate for research questions that inquire about self-reported behaviors, attitudes, and beliefs (Neuman, 2006). The mail survey is also a relatively cheap method of data collection. Other benefits include the fact these can be conducted by a single researcher and allow for a wide geographical area, such as Utah, to be covered rapidly. Surveys also tend to result in high response rates when the target population has a strong interest in the topic; this would be expected of OHV owners as they have already exhibited a large financial and personal commitment in purchasing an OHV. The use of mail surveys also allow the researcher to inquire about many things at one time, measure many variables, and test several hypotheses at once based on the responses from a relatively large sample (Neuman).

Sample and Administration of the Survey

OHVs are often popularly defined as 4-wheel drive jeeps, motorcycles designed for off-highway use, all-terrain vehicles, better known as ATVs, and other specially designed off-road motor vehicles (e.g., dune buggies, rock crawlers, and sand rails). Over snow machines such as snow-mobiles are also considered in a broad definition of OHVs; however these vehicles are not within the scope of this thesis and have been excluded from analysis.

The State of Utah requires that all OHVs are registered with the Utah Department of Motor Vehicles (DMV). This list of registrations is theoretically a census of all the OHVs within the State. Therefore, this list is essential to surveying OHV owners at the statewide level. The list was obtained from the Utah DMV via the Utah Division of Parks and Recreation. This list was then refined, eliminating duplicate entries. A random sample of 1,500 owners was then drawn from the list. Those individuals were then sent the survey instrument, which was developed by Utah State University's Institute for Outdoor Recreation and Tourism (IORT). The mail survey was administered according to a modified Dillman Method (Dillman, 2000). The method called for the mailing of a survey packet, which included a cover letter, the survey instrument, a map of Utah, and a return envelope. A reminder post card and two subsequent packet mailings followed that indicated an increasing urgency and importance that the respondent returns the survey. After three mailings of the packet, if the potential respondent had not returned the survey or notified the research team why they were unable to, the correspondence was then terminated and the respondent was tallied as a non-response. Of the 1,500 surveys sent, 84 were returned either because the respondent had moved or

because they had died since they last registered their OHV. In total, 1,416 Utah OHV owners received surveys, 600 of which were returned completed; this tabulates out to a 42.4% response rate.

Nonresponse Bias

Non-response bias was not checked in this study due to time and financial considerations. The 42% response rate is admittedly low, especially given that this survey solicited information on individuals' leisure behavior as opposed to personal information that certain individuals may want to withhold. Methodologists do not clearly define an "adequate" response rate however. Salant and Dillman (1994) suggest a minimum of 60% for public mail surveys, as reliable statistical inference requires a high rate. The rate for this study is admittedly low, but given that the target population represents a narrow spectrum (OHV owners) of the general population, non-response bias is expected to be minimal. Recent research has even suggested that different response rates have a minimal effect on response bias (e.g., Curtin, Presser, & Singer, 2000; Keeter, Miller, Kohut, Groves, & Presser, 2000).

Measures and Statistical Processes

Measuring Specialization

Interspersed throughout the survey instrument (Appendix C) were 11 different measures of specialization, adapted from the literature review. More detail and explanation is given about the specific measures used in this study on page 19, they are only reiterated here.

The 11 measures chosen are centered around the three aforementioned domains championed by Scott and Shafer (2001) and frequently observed throughout the framework's development (see Appendix B). These dimensions again are behavior (which often includes expenditures), skills/knowledge, and commitment.[5]

Behavior is measured by: the total number of trips respondents have taken within the past 12 months; the percentage of their life spent riding OHVs; the total number of vehicles they own; the amount spent on OHVs expenses[6] within the past 12 months; the amount spent on miscellaneous OHV items;[7] the amount spent on support equipment[8] over the past 12 months; and the amount they have spent on OHV equipment and supplies over their entire lifetime. Again these measures are consistent with previous specialization research.

The skill domain is operationalized through two variables in this study; these are the respondents' self-assessed skill level their preference for trail difficulty. Both of these variables are fairly standard measures of skill seen throughout the specialization literature.

I refer to the affective dimension as centrality rather than the broader category of commitment, acknowledging the paucity of information collected for this study concerning the role of OHV riding in the recreationist's life. No matter the name, the dimension should be understood as key to an individual's level of involvement. It is

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[5] Commitment is operationalized for the purposes of this study as *centrality* because no questions were asked concerning an individual's enduring involvement in the activity, a component often used to measure the commitment dimension.

[6] *OHV expenses* includes OHVs purchased, custom parts/installation, tools tires/rims, and parts/repairs

[7] *Miscellaneous items* includes riding apparel, safety gear, emergency supplies, membership fees, and entry fees.

[8] *Support equipment* includes equipment purchased exclusively for OHVs.

unquestionably broader than it has been operationalized here.

The dimension of centrality can be measured in a variety of ways (see Appendix B) that ask respondents a series of questions about how central the recreational activity is to their lifestyle. For the purposes of this thesis, the domain of centrality will be measured through two variables. These variables are: (1) the total number of routine annual trips to a particular place for a particular reason on a particular date each year (e.g., routine annual trips taken to Little Sahara Recreation Area on Memorial Day for family reunions); and (2) the total number of voluntary association groups, such as OHV clubs or open-access advocacy groups, that an OHV owner may be a member of.

Statistical Processes

Previous specialization research has measured the construct by summing standardized scores from measured variables (e.g., Donnelly et al., 1986; Dyck et al., 2003; Kerstetter, Confer, & Graefe, 2001). The summed scores are then used to place individual recreationists along the specialization continuum. The continuum can then be treated as continuous (e.g., Virden & Schreyer, 1988) or subdivided based on researcher determined cut-points (e.g., Dyck et al.; Kerstetter et al.). This approach is overly simplistic and assumes that the dimensions co-vary, meaning as an individual participates more in the activity, a behavioral measure, they are *assumed* to increase in skill level or knowledge and their commitment to the activity. Previous research (Lee & Scott, 2004) has shown that the summative approach is inappropriate as the three dimensions rarely increase in a uniform fashion (Kuentzel & McDonald, 1992; Scott, Menzel Baker, &

Kim, 1999; Scott & Thigpen, 2003); therefore it will not be conducted on the Utah OHV owner data.

Confirmatory factor analysis, a tool that allows for the representation of relationships among observed variables in terms of latent constructs (Knoke, Bohrnstedt, & Mee, 2002), was utilized on standardized scores for the 11 measures. Confirmatory factor analysis requires that the researcher posit an "a priori theoretical measurement model to describe or explain the relationship between the underlying unobserved constructs," in this case specialization, "and the empirical measures" (Knoke et al., p. 414). For the purpose of this thesis, the theoretical model analyzes all 11 variables in terms of the latent construct *specialization* (Figure 3). This is accomplished via the confirmatory factor analysis that requires the researcher to specify the exact number of factors to be extracted from the empirical measures. Here we specify only one, specialization, relying on the previous specialization research to tell us that we have a set of empirical measures that adequately encompass a recreationist's specialization level.

The relationship between construct(s) and measurements are exhibited via parameters called factor loadings. Factor loadings are the correlation coefficients between the variable and the latent construct. In other words, they measure the strength of the relationship between a measured variable and latent factor. The stronger the relationship the more closely related the variable is to the factor. Usually values of 0.40 or greater are required to show a significantly strong relationship (Knoke et al., 2002) and to retain the variable in the model. This thesis will adopt this rubicon and remove from the model any variable that does not have a factor loading value of at least 0.40.

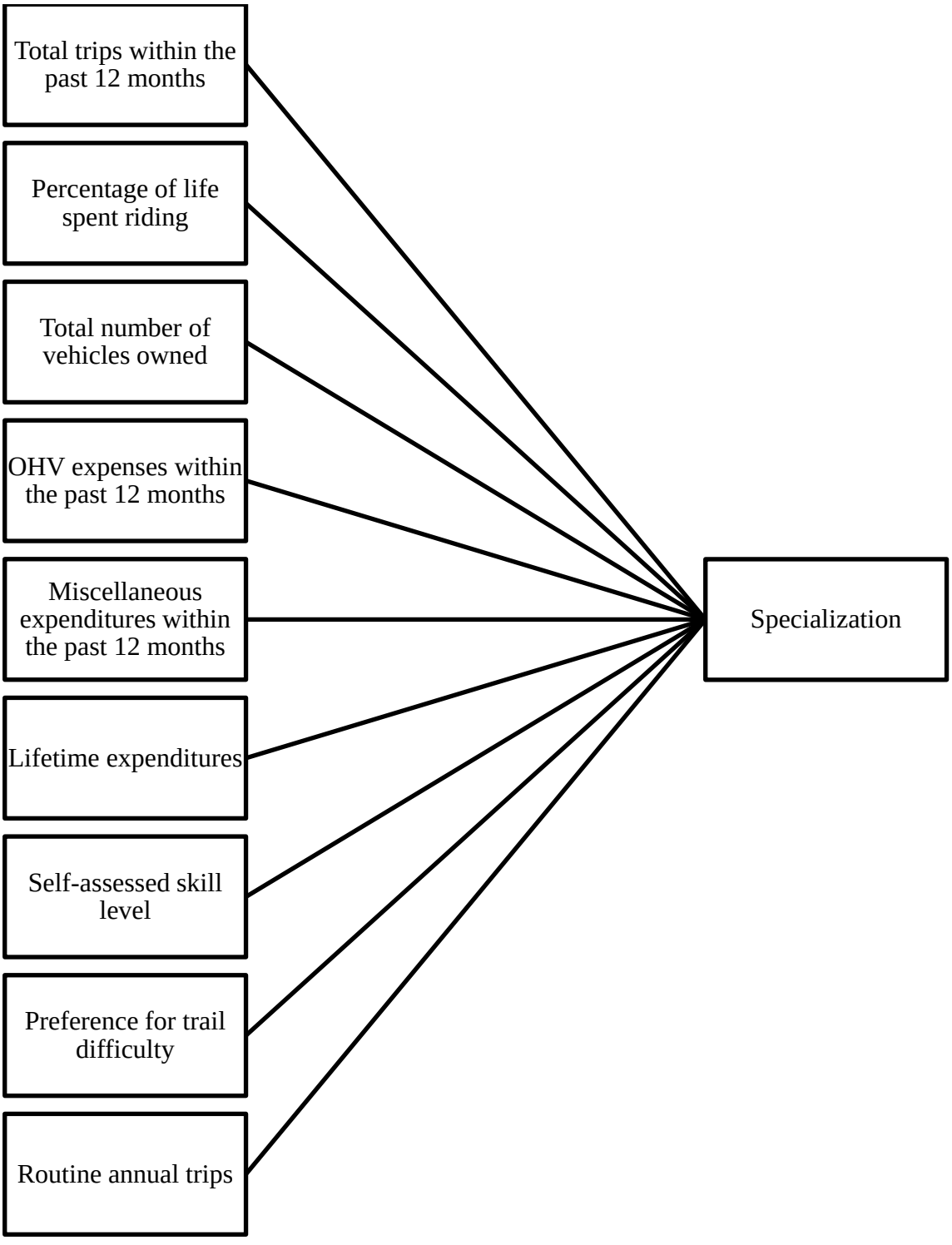

Figure 3. First-order specialization model.

Cronbach's α, a measure of internal consistency for multi-item indexes (Knoke et al., 2002), was used to show whether the empirical measures combined to measure specialization produce similar scores. In other words the Cronbach's α value shows the extent to which OHV owners favor one end of the continuum or the other *consistently* throughout all of the empirical measures. A value greater than 0.70 is usually required to show the measures are correlated enough to represent the latent factor (Knoke et al.).

Assuming a high level of internal consistency (Cronbach's $\alpha \geq 0.70$), high factor loadings (≥ 0.40), and the strong theoretical basis for assembling of the model of specialization, individual OHV owners can be segregated to determine specialization groups. This segregation is accomplished through K-means cluster analysis, a way of determining the most homogenous sub-groups within a larger population (Romesburg, 2004). It requires the researcher to specify in advance the desired number of clusters, K.

> Initial cluster centers are chosen randomly in a first pass of the data, then each additional iteration groups observations based on nearest Euclidean distance to the mean of the cluster. That is, the algorithm seeks to minimize within-cluster variance and maximize variability between clusters in an ANOVA-like fashion. Cluster centers change at each pass. The process continues until cluster means do not shift more than a given cut-off value or the iteration limit is reached. (Cluster analysis, 2008)

While K-means cluster analysis still requires the researcher to determine the number of clusters, it reduces the researcher bias prevalent in specialization studies where summative approaches are used and arbitrary cut-points are established by the researcher. Cluster analysis also allows for the three dimensions, behavior, skills/knowledge, and commitment to vary *independent* of one another. A critical and potentially false assumption that is inherited if the summative approach is taken.

Previous specialization research has identified two, three, and four sub-group clusters. K-means cluster analysis will be run in an exploratory fashion, requiring two, three, four, and five groups to be identified. An adequate solution (number of specialization groups) is expected to be consistent with the literature (i.e., two to four groups) and have adequate sample sizes in each of the groups.[9] Means of the 11 measures can then be analyzed between the groups using ANOVAs to determine any significant differences.

Measuring Environmental Attitudes

As previously mentioned, the New Ecological Paradigm assesses environmental attitudes using a 15 item scale. Respondents rate these items on a 5-point Likert scale where 1 = *strongly disagree* and 5 = *strongly agree*. The 15 statements were designed to tap one of the five theorized dimensions of an individual's environmental orientation (Dunlap et al., 2000). The statements are arranged and worded to achieve a balance between pro- and anti- ecological worldview statements. The eight odd numbered items are worded so that agreement indicates a pro-environmental attitude, and the seven even-numbered ones so that disagreement indicates a pro-environmental attitude (Dunlap et al.) (see Table 2). As a result, the even numbered items must be recoded (i.e., if an individual said they strongly disagreed with the statement "the earth has plenty of natural resources…," it was coded on the opposite end of the scale. Simply converting their answer to mean strong agreement with the anti-statement of "the earth *does not* have

[9] Imposing the condition that at least 10% of the entire sample be included in the smallest group (i.e., at least 60 OHV owners).

plenty of natural resources…." This reverse coding process is utilized so that high scores indicate stronger environmental attitudes than weak scores for *all* 15 statements.

Potential Response Bias Caused by Using the NEP Scale

Concern arose during the formulation of the survey instrument as to whether or not to include questions that directly asked respondents about their environmental attitudes. It was believed by some that the inclusion of these questions may foster a sense of resentment towards the researchers on the part of OHV owners who are most likely very aware of the criticisms that have been leveled against them regarding their activities' impact on the environment. These concerns however, were allayed and the NEP was included in the questionnaire. The true effect of including the scale on non-response bias however was never definitively addressed, a fault acknowledged by the researcher.[10]

Statistical Processes

Once the statements were coded accordingly, the NEP scale was analyzed using first-order exploratory factor analysis. Exploratory factor analysis, as opposed to confirmatory factory analysis simply implies that the researcher does not force the variables to all load onto a set number of factors, instead the variables are allowed to organize around previously undefined factors in patterns that maximize the correlation between themselves and potential latent factors. Exploratory factor analysis allows for the researcher to determine whether the five dimensions of ecological paradigms, around

[10] However, of the 600 individuals who successfully completed and returned the surveys, 580 (nearly 97%) completed the NEP scale section. This can be compared to the 514 (about 86%) who answered the question concerning their income.

which the instrument was designed, manifest themselves through the observed factors' variation (Knoke et al., 2002). The factors' variation is shown through squaring and then summing the factor loadings for all of the variables within the model. The resultant value is called an eigenvalue. Eigenvalues are important because they tell us how many significant factors can be found in the variables provided. Values over 1.0 indicate that a significant amount of the variation can be explained through the resulting factor; likewise values below 1.0 indicate the opposite. This thesis will adopt this standard and not report on any factor that does not have an eigenvalue of at least 1.0

Once the factors with eigenvalues over 1.0 emerge, the researcher must interpret what they represent. It may be one of the dimensions posed by the developers of the NEP or something hybridized between the variables. The researcher is guided on this point by the correlation component matrix which exhibits the correlation between the variables and the factor, similar to a factor loading score. Based on the existing literature (Dunlap et al., 2000), factor analyzing the 15 NEP items typically yields two or more factors. While not likely, there is a probability that all five of the hypothesized concepts can emerge independently.

If no factors emerge that are consistent with their theoretical dimensions, the scale can, and often is, combined into a single measure of environmental attitude. If this is the case, all of the variables are reentered into a factor analysis, only this time it is confirmatory rather than exploratory and all of the empirical measures are forced to load onto one factor. In this case that factor would be the latent construct called *environmental attitude*. Internal consistency will also be checked using Cronbach's α.

Once the factors have emerged from the factor analysis process described above, the variables can be segregated according to those factors that they are most highly correlated with. If only one factor emerges, or the factors that do emerge are inconsistent with the five NEP dimensions, all the variables will remain together to represent the composite environmental attitude index. This index score can then be analyzed across the already determined specialization groups using ANOVAs. ANOVAs allow statistically significant differences between groups to be identified.

Measuring Motivations

The literature on motivations for leisure has developed a fairly exhaustive list of potential motivations and experiences that can be measured (Moore & Driver, 2005). For the purposes of this thesis, a relatively short list (21 measures) was utilized (Table 3, p. 45) as adapted from a list initially developed by Driver (1983) and later published in its entirety by the Canadian Parks/Recreation Association (1997).

Statistical Processes

The motivation measures will be analyzed for internal consistency within their intended dimensions using Cronbach's α. Based on the existing literature (Driver, 1976; Driver & Cooksey, 1980; Knopf, 1983; Knopf et al., 1973) and high internal consistency, the motivation domains can be analyzed across specialization groups using ANOVAs that allow statistically significant differences in mean scores between groups to be determined.

CHAPTER IV

RESULTS

Validity and Consistency of Specialization Dimensions

Eleven variables were originally included in the specialization model; however first-order confirmatory factor analysis[11] revealed low correlation (factor loadings < .40) between the *total number of group memberships* variable, used to measure centrality, and the resulting specialization factor. Low correlation was also exhibited between the *support equipment* variable, used to measure equipment and expenditures, and the specialization factor. Factor loadings that are not above 0.40 are usually deleted from the model, as they do not correlate strongly enough with the researcher's a priori theory (Knoke et al., 2002). Following this standard, both variables mentioned above were subsequently deleted from the model. Table 4 presents the medians and standard deviations of all eleven variables originally included in the model.

Reliability analysis was performed and the data demonstrated high internal consistency with a Cronbach's α value of 0.71. Factor loadings were satisfactory (i.e., $\geq$ 0.40) for all measures of specialization, after the two aforementioned variables were deleted. Further removal of any measured variables did not improve internal consistency. Also, an eigenvalue of 2.76 was obtained; this translates into just over 30% of the variance in the empirical measures being explained by the new latent construct of specialization. An eigenvalue can be interpreted as the amount of variance in all of the

[11] Confirmatory factor analysis is the statistical tool that allows for the representation of relationships among empirical measures in terms of the latent construct.

Table 4

Factor and Consistency Analysis of Specialization Dimensions

Specialization dimension and variable	Median	Factor Loadings
Behavior		
Total trips within the past 12 months	6.0	.41
Percentage of life riding	44%	.51
Number of vehicles owned	2.0	.56
Amount spent on OHV expenses[a]	$200	.70
Amount spent on miscellaneous items[b]	$50	.70
Lifetime expenditures on equipment	$20,000	.55
Amount spent on support equipment[c]	$0	N/A
Skill		
Self-assessed skill level	4.0[d]	.53
Preference for trail difficulty	2.0[e]	.54
Centrality		
Number of routine yearly trips	0.0	.42
Total number of group memberships[c]	0.0	N/A

Note. Cronbach's α = 0.71; Eigenvalue = 2.76; Variance explained = 30.67

[a] Includes OHVs purchased, custom parts/installation, tools, tires/rims, and parts/repairs. [b] Includes riding apparel, safety gear, emergency supplies, memberships, and entry fees. [c] Deleted from the model due to low factor loading values. [d] On the scale where 1 = *beginner*, 2 = *novice.* 3 = *intermediate*, 4 = advanced, and 5 = *expert*. [e] On a scale where 1 = *easiest*, 2 = *more difficult*, 3 = *most difficult*, and 4 = *extreme*.

variables that can be accounted for by that factor. Here, using confirmatory factor analysis and forcing all of the variables to load onto a single factor, the eigenvalue isn't very telling. That's because we already know what we're looking for in the first factor, specialization. Values over 1.0 show that a statistically significant amount of the observed variance in all of the empirical measures can be explained by the new latent construct, in this case specialization. Likewise, values below 1.0 indicate that not enough of the variance was explained to warrant significance. So all told, the factor analysis' most important functions were to show the total amount of variance explained, to aid in the deletion of poorly correlated variables, and finally to support the use of specialization as a latent construct through the use of a high Cronbach α value.

The equipment variables were more closely correlated to the latent construct than were the variables identified to measure participation history, skill, and centrality. *OHV expenses* and *miscellaneous expenses* had the two highest factor loadings with both exhibiting 0.70 scores. *Number of vehicles* owned exhibited the third highest loading (0.56) followed by *lifetime expenditures* (0.55), *preference for trail difficulty* (0.54), and *self-assessed skill level* (0.53).

Overall, half of Utah's OHV owners take at least six trips per year and own at least two OHVs. Last year, half of them spent $200 on OHV related expenses and $50 on miscellaneous items. Over their entire lifetimes, half of all Utah OHV owners have spent $20,000 on the activity. They tend to say they are fairly skilled with half identifying themselves as "advanced" riders who prefer "more difficult" trails. Not surprisingly, most did not belong to a voluntary association. The routine annual trips variable showed that most rider *do not* take a repeated trip to a particular place for a

particular reason.

Ancillary confirmatory factor analysis tested a third-factor model[12] (Figure 4), however the first-order factors did not exhibit high enough consistency coefficients (i.e., low Cronbach's α scores) to justify continued approach using the model.

Cluster Analysis of Specialization Dimensions

Having demonstrated adequate internal consistency through an acceptable Cronbach's α value, and high correlation coefficients via factor loadings greater than 0.40, standardized scores for each of the empirical measures were interpreted using K-means cluster analysis. Several iterations of the analysis were explored, forcing the variables into two to five clusters. A three-cluster solution proved to fit the data most appropriately, as adequate group sizes[13] fell into each cluster. Cluster one had 256 cases, cluster two 64, and finally cluster three was occupied by 152 cases. Three cluster solutions are also the most typical result of cluster analysis when applied to the specialization framework (Scott et al., 2005).

Average values of the nine variables were then compared across the three clusters to identify how the clusters differed; the results are presented in tables 5, 6, and 7. The groups differed significantly across all nine dimensions of specialization with $F \leq 16.798$, $df = 2$, $p < .000$. Based on a comparison of the average values and significant differences

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[12] The third-order factor analysis loaded the variables onto their respective dimensions before being loaded onto the specialization construct. For example, the two skill variables were loaded onto the first-order factor 'skill', the three behavior variables were loaded on a 'behavior' factor, and the three equipment variables loading on an 'equipment' factor before index scores for each of those factors were loaded onto the second-order factor 'owner specialization') (See Figure 4).

[13] Imposing the condition that at least 10% of the entire sample be included in the smallest group (i.e., at least 60 OHV owners).

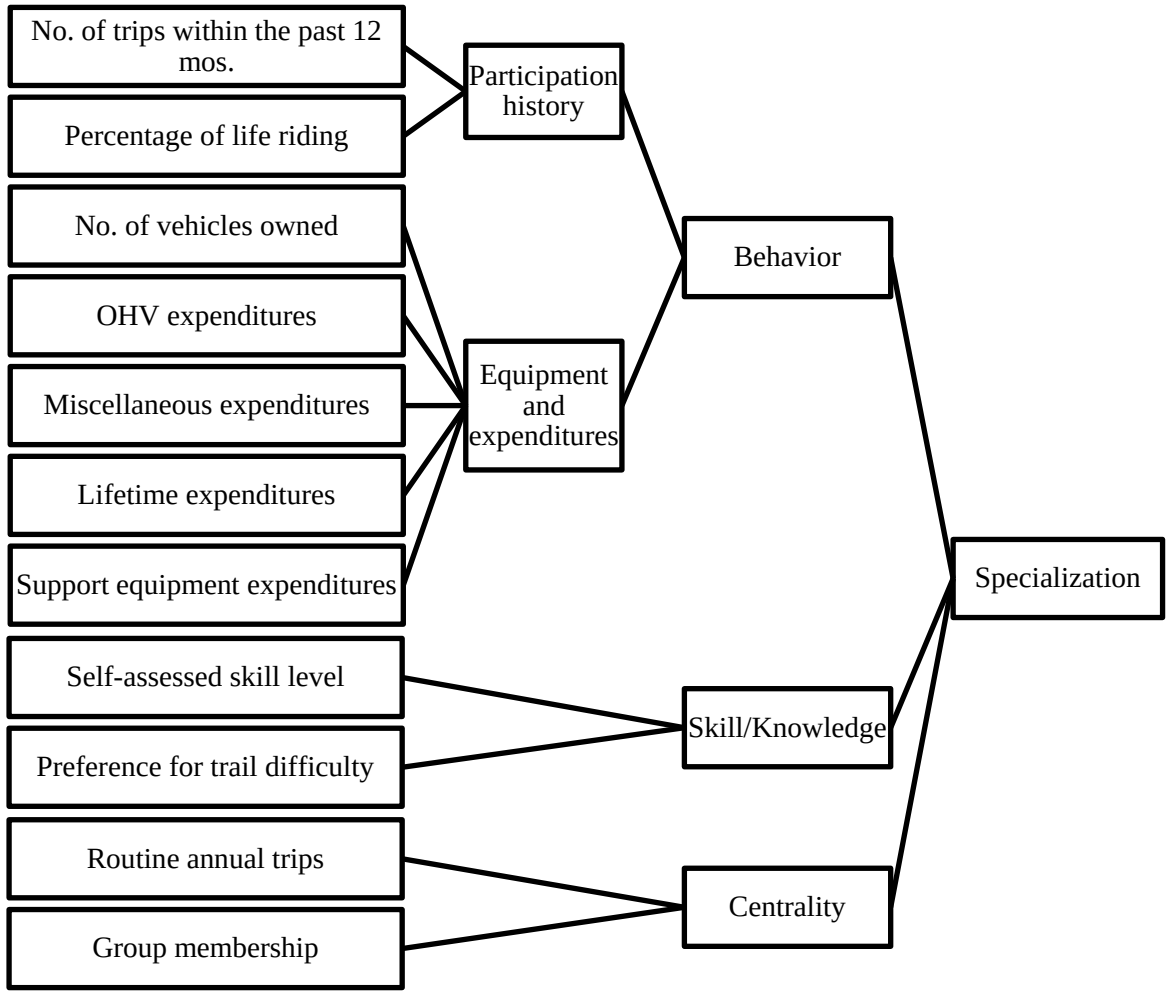

Figure 4. Third-order specialization model.

between groups (assessed using Tukey's post-hoc tests[14]) the three clusters were identified as (1) casual owners, (2) frequent users, and (3) experienced owners.

Casual owners ranked lowest on all nine variables. They do not own as many vehicles, take fewer trips, have ridden for a smaller proportion of their life, and have

[14] Tukey's post-hoc test is simply an ANOVA between two specific groups.

Table 5

Comparison of Specialization Measures Across Groups

Specialization measures		Clusters/Groups		
	Average	Casual (*n*=256)	Frequent (*n*=64)	Experienced (*n*=152)
Behavior				
Total trips within the past 12 months	Median	5.0[ef]	12.5[eg]	8.0[fg]
Percentage of life riding	Median	27%[ef]	51%[eg]	68%[fg]
Number of vehicles owned	Median	2.0[ef]	4.0[e]	3.0[f]
Amount spent on OHV expenses[a]	Median	$100[ef]	$10,000[eg]	$400[fg]
Amount spent on miscellaneous items[b]	Median	$20[ef]	$200[eg]	$100[fg]
Lifetime expenditures on equipment	Median	$14,000[ef]	$30,000[eg]	$35,000[fg]

(table continues)

Specialization measures	Average	Clusters/Groups: Casual (n=256)	Frequent (n=64)	Experienced (n=152)
Skill				
Self-assessed skill level[c]	Mode	$4.0^{N/A}$	$4.0^{N/A}$	$4.0^{N/A}$
Preference for trail difficulty[d]	Mode	$2.0^{N/A}$	$2.0^{N/A}$	$3.0^{N/A}$
Centrality				
Number of routine annual trips	*M*	0.4^{ef}	0.8^{eg}	1.1^{fg}

Note. Values with different superscripts differ significantly between groups (Tukey's post-hoc test, $p < .05$).

[a] OHV expenses includes OHVs purchased, custom parts/installation, tools tires/rims, and parts/repairs. [b] Miscellaneous items includes riding apparel, safety gear, emergency supplies, membership fees, and entry fees. [c] See Table 6 for more detailed comparisons across groups. [d] See Table 7 for more detailed comparisons across groups.

made a smaller financial commitment to the activity than their non-casual counterparts. Casual owners tend to identify themselves as less skilled and preferring easier trails when compared to the other two groups. These owners are also less likely to take a routine annual trip to a particular place for a particular reason.

The second sub-group of Utah's OHV owner population was identified as *frequent* users. They take more trips per year than either of the other two groups and are the most financially invested in the activity, outspending the other groups on OHVs and miscellaneous expenses.[15]

The final sub-group was identified as *experienced* riders. They were classified as such because they tend to identify themselves as more advanced riders than the other two groups (see Table 6); they also prefer more difficult trails (see Table 8). These riders have also been riding for the largest proportion of their life when compared to the other two groups. This is a key component to the specialization framework given the theoretical assumption inherent in the framework that recreationists progress to a more specialized state over the course of their lives. The distributions of these sub-groups differed significantly, $\chi^2 = 117.42$, $df = 2$, $p < .001$.

While three distinct groups were found through the cluster analysis, several interesting findings manifested themselves through a comparison of the average values. Most noticeably were the similarities among the frequent and experienced groups in their significant differences to the casual group. Significant differences were seen between the casual group and the two advanced groups on each of the nine measures. Beyond the identification of a less specialized group and two more specialized groups shown by a persistent linear relationship across all nine empirical measures, not much can be interpreted.

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[15] *OHV expenses* include OHVs purchased, custom parts/installation, tools, tires/rims, and parts/repairs. *Miscellaneous expenses* includes riding apparel, safety gear, emergency supplies, memberships, and entry fees.

Table 6

Comparison of Self-Assessed Skill Levels Across Specialization Groups

	Specialization group		
Response Categories	*Casual*	*Frequent*	*Experienced*
Beginner	3.1%	0.0%	0.0%
Novice	4.3%	0.0%	0.0%
Intermediate	41.4%	23.4%	8.6%
Advanced	48.4%	60.9%	59.9%
Expert	2.7%	15.6%	31.6%

Note. $\chi^2 = 113.8$, $df = 8$, $p \leq 0.001$

Table 7

Comparison of Preferences for Trail Difficulty Across Specialization Groups

	Specialization group		
Response Categories	*Casual*	*Frequent*	*Experienced*
Easiest	30.1%	4.7%	5.9%
More difficult	58.2%	54.7%	40.8%
Most difficult	11.7%	31.3%	38.8%
Extreme	0%	9.4%	14.5%

Note. $\chi^2 = 110.657$, $df = 6$, $p \leq 0.001$

How specialization groups differ beyond the casual group is still unclear. If a similar linear relationship were also to be seen between the two advanced groups (i.e., one group favoring the higher end of all of the empirical measures), then we could interpret the differences more definitively. The findings would support the idea of progression throughout the specialization framework given that all the indices co-vary consistently. However, given the result of this thesis, progression is not supported and little can be said about how OHV owners progress through the specialization continuum over their lives. All we are definitively able to say is that differences were not as dramatic between the two advanced groups relative to their differences with the casual group. All told, only across-the-board differences were noticed between the casual group and the two advanced groups. For the purposes of this thesis, subsequent analysis will analyze the three groups independent of each other. However, future research should be particularly cognizant of the differences that may become apparent among more advanced groups.

Differences Across Specialization Groups

The survey instrument also gathered a host of other information on OHV users that will be helpful in distinguishing differences between the three specialization groups. This information includes: the number of each type of vehicle owned; the size of respondents' group on their most recent trip; the composition (i.e., family, friends, others) of that group; the length of the respondent's most recent trip; the activities they participated in on that trip; the respondent's level of education; the proportion of their life they have spent in Utah; their income; their age; the number of children they have under

18 years of age; their household size; and finally, their marital status.

Number of Each Type of Vehicle Owned

Among these, significant differences were found for the number of *each type* of vehicle owned with $F \leq 4.802$, $df = 2$, $p \leq .009$ (Table 8). Most important to note here is the mean differences between groups. The casual OHV owners differentiate themselves here quite strongly with Tukey's post-hoc tests revealing significant differences ($p \leq .05$) for the "motorcycle" and "ATV" categories when compared to both the frequent and experienced owners. Casual as well as frequent owners of off-highway motorcycles on average own fewer bikes than owners in the experienced group. This pattern is also seen for owners of ATVs with casual owners owning one less vehicle than their frequent counterparts and nearly one-half vehicle less than the experienced owners. These differences were expected given the somewhat circular logic of using to*tal number of vehicles owned* as a measure of specialization and then comparing the resultant clusters back to *number of vehicles owned* for each vehicle category. Given their small proportion of owners, no significance should be inferred between groups for the following three vehicle categories: "other non-street-legal 4-wheel drive vehicles," "dune buggies or sand rails," and "snowmobiles or snowcats."

Group Size

No significant differences in mean size of the recreationist's group were noticed with $F = 2.860$, $df = 2$, $p = .058$.

Group Composition

Table 9 shows a slight significant difference in the number of immediate family members involved in the recreationist's most recent trip $F = 15.586$, $df = 2$, $p = .025$. No significance was found for the number of extended family members or friends as $F \geq 14.108$, $df = 2$, $p \geq .216$. It was expected that the OHV owners in the casual user group would recreate with more members of their family relative to the experienced group due to the fact that each group holds a significantly different preference for trail difficulty. The data did not support this hypothesis however.

Table 8

Mean Number of Vehicles Owned Within a Specialization Group

	Specialization group			Significance	
Vehicle Type	Casual	Frequent	Experienced	*F*	*p*
Off-highway motorcycles	0.3^{a}	0.6^{b}	1.1^{ab}	20.74	< .01
3 or 4 wheel ATVs	1.7^{ab}	2.6^{ac}	2.1^{bc}	17.38	< .01

Note. Means with different superscripts differ significantly between groups (Tukey's post-hoc test, $p < .05$).

Trip Length

No significant differences in length of the recreationist's most recent trip were noticed with $F \geq 1.004$, $df = 2$, $p \geq .119$.

Table 9

Mean Number of Immediate Family Members in Group By Specialization Group

	Specialization group			Significance	
	Casual	Frequent	Experienced	*F*	*p*
Immediate Family Members in Group	2.0	2.6	2.4	15.59	< .05

Note. Tukey's post-hoc test did not reveal significant ($p < .05$) differences between individual groups.

Other Recreational Activities

The specialization groups were analyzed to determine if there were any significant differences in other recreational activities the respondents typically participate in while utilizing their OHV. The activities dirt biking and camping were significant at the .001 level. The significance of the "dirt biking" activity should not be considered noteworthy or valid however, as only 17% of all OHV owners participated in the activity.

For camping, 36% of casual owners reported that they went while on a trip that involved their OHV, while 50% of the frequent group and 58% of the experienced group did. Table 10 shows that significant differences at the .05 level were noticed across five of the other 19 activities inquired about. These activities include, trail riding, photography, picnicking, hill climbing, and competitive events. These differences suggest that specialization level of OHV owners may be a useful indicator of *certain* ancillary recreational activities that individuals are likely to participate in while utilizing their OHVs. This leaves 14 activities out of 21 that were not significantly different across specialization levels. Overall, this suggests a low correlation between

specialization levels, if not OHV use entirely, and participation in other recreational activities.

Table 10

Percent Participating in Other Recreational Activities Between Groups

	Specialization Group			Significance[a]	
Activity	Casual	Frequent	Experienced	*F*	*P*
Camping	36%[b]	50%	58%[b]	9.47	.000
Dirt biking	11%[b]	11%[c]	30%[bc]	13.31	.000
Photography	29%[b]	27%	42%[b]	4.23	.015
Picnicking	17%[b]	31%[b]	26%	3.92	.021
Competitive event	0%[b]	2%	3%[b]	3.25	.040
Trail riding	74%	84%	83%	3.21	.041
Hill climbing	15%[b]	19%	25%[b]	3.22	.041
Visiting historic sites	10%	13%	18%	2.73	.066
Backpacking	0%	0%	3%	2.68	.069
Sightseeing	49%	61%	49%	1.62	.200
Swimming	6%	13%	8%	1.41	.244
Driving backroads	53%	63%	60%	1.34	.264
Open area driving	19%	25%	25%	1.14	.320
Hunting	12%	6%	9%	1.13	.325

(table continues)

Activity	Specialization group			Significance[a]	
	Casual	Frequent	Experienced	*F*	*P*
Boating	5%	2%	6%	0.96	.384
River running	2%	0%	1%	0.77	.463
Wildlife/bird watching	18%	23%	21%	0.71	.493
Hiking/walking	30%	34%	35%	0.55	.578
Fishing	19%	16%	20%	0.25	.777
Target shooting	13%	13%	15%	0.18	.834
Rock climbing	1%	2%	1%	0.03	.969

Note. Means with different superscripts differ significantly between groups (Tukey's post-hoc test, p <.05).

[a]*df* = 2 for each ANOVA.

Demographic Differences

No significant differences were found in the respondents' level of education (χ^2 = 6.683, *df* = 10, *p* =.755), their proportion of life spent in Utah (*F* = 5.164, *df* = 2, *p* = .006), the number of children they have under 18 years of age (*F* = 4.463, *df* = 2, *p* = .012), their household size (*F* = 3.845, *df* = 2, *p* = .022), or their marital status (χ^2 = 9.046, *df* = 6, *p* = .171).

Significant differences (χ^2 = 28.87, *df* = 16, *p* = .025) however, were found between groups for the income variable. Casual owners have lower incomes (Modal category = $50,000 to $74,999) when compared to the other two groups (Modal category = $75,000 to $99,999). This finding would be expected as multiple vehicle ownership and frequent OHV trips require high levels of investment in the activity that logically

depends on higher income levels.

Significant differences ($F = 11.48$, $df = 2$, $p < .001$) were also noticed for the owners' age across specialization groups. Casual owners tend to be older ($M = 50.6$) than either the frequent owners ($M = 44.7$) or the experienced owners ($M = 45.3$).

Validity and Consistency of Measured Environmental Attitudes

Table 11 presents the means and standard deviations of the final 12 variables used to measure environmental attitudes (see Appendix D for frequencies). There were 15 variables originally included in the model; however the first iteration of exploratory factor analysis revealed low factor loadings (< .40) on two of the limits to growth measures and one anti-exemptionalism measure. These three variables were subsequently deleted from the model.

The remaining 12 NEP variables displayed a high acceptance for factor analysis through a Kaiser-Meyer-Olkin Measure of Sampling Adequacy[16] score of 0.897 where measures close to 1.0 indicate that a latent factor is present. The variables were also tested using Bartlett's Test of Sphericity.[17] Small p values produced by this test, less than .05, indicate that the data are highly inter-related. The NEP measures had a p value < .001. Both of these pre-tests mean that latent factors are very likely present in the 12 NEP measures; they warrant further exploration using exploratory factor analysis.

Exploratory factor analysis revealed that a single factor model (i.e., all 12

[16] The Kaiser-Meyer-Olkin Measure of Sampling Adequacy is a statistic that indicates the proportion of variance within variables that might be caused by underlying factors (SPSS, 2006)

[17] Bartlett's Test of Sphericity is a test which determines the inter-relatedness between variables (SPSS, 2006).

observed variables forced to load onto the latent construct, environmental attitude, See Figure 5) was the most appropriate way to analyze the observed NEP variables as subsequent factors beyond the first explained little of the variance in the model. Four factors actually emerged (shown by eigenvalues > 1.0), however none of the last three factors exhibited a set of variables that were either theoretically linked or showed individual variables that were much more strongly correlated to their factor than that variable was to the first factor (see Appendix E for the correlation component matrix). The first factor which was correlated to most of the variables highly (Table 11) explains 41.0% of the variance, while the second, third, and fourth factors only explained 9.5%, 7.8%, and 7.0% respectively. Utilizing a one factor model is also the preferred application of the scale as per its designers (Dunlap et al., 2000). They recommend combining the "set of items into a single measure rather than creating ad hoc dimensions that emerge from various factoring techniques" (Dunlap et al., p. 431).

The factor analysis demonstrated that the data provided an acceptable fit (Table 11) as the majority of the observed variables loaded strongly (i.e., factor loadings > .40). However, three statement variables: "the earth has a finite amount of room and resources," "the earth has plenty of natural resources if we just learn how to develop them" (reverse coded), and "humans will eventually learn how nature works to be able to control it" (reverse coded), exhibited low factor loadings (<.40) during the initial first-order factor analysis, meaning they were not strongly correlated to the latent factor. Subsequently, they were deleted from the model. The second iteration of the factor analysis exhibited the best fit to the data with strong loadings across all 12 variables. Loadings ranged from 0.76 for the statement: "if things continue on their present course,

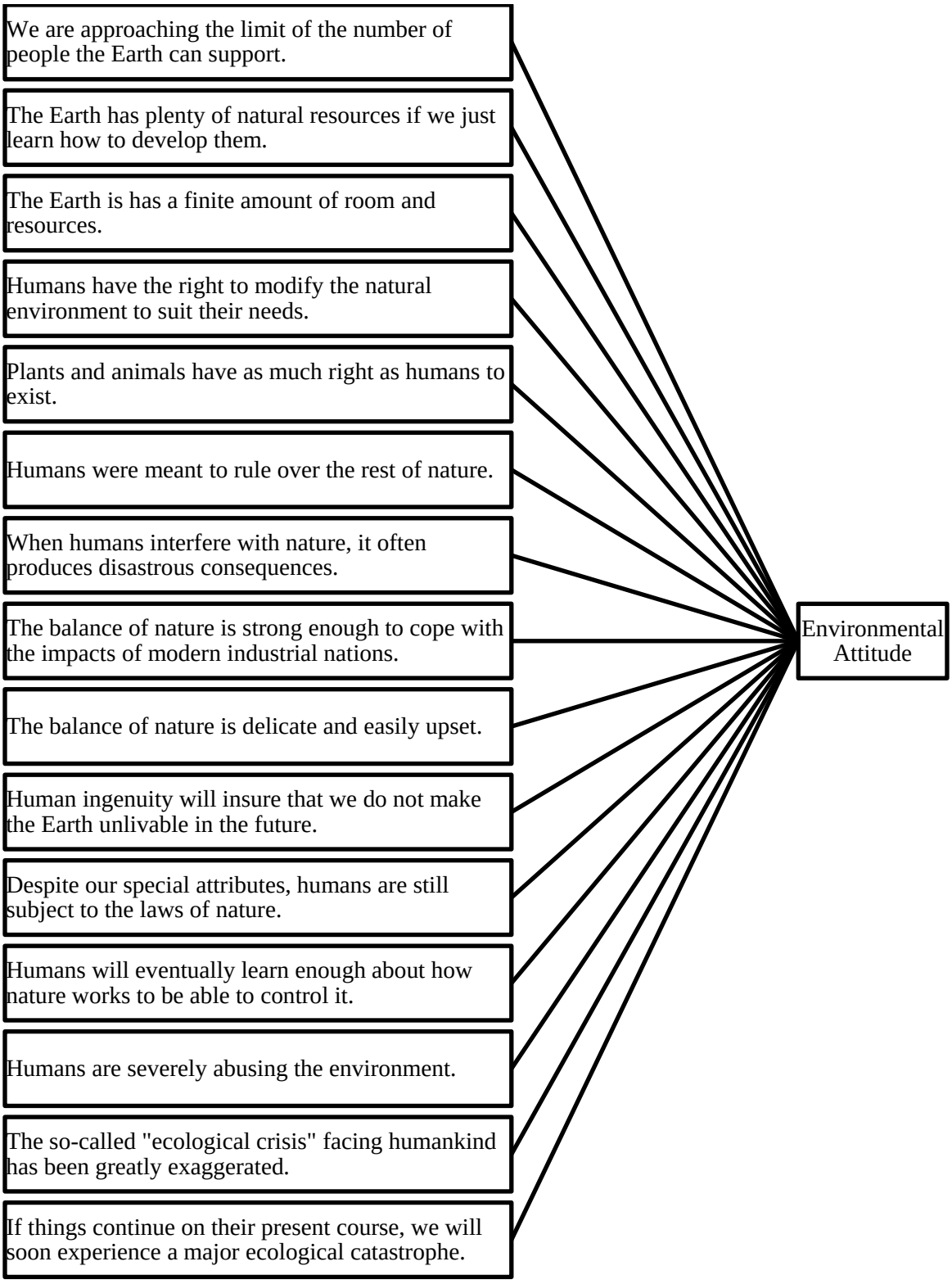

Figure 5. First-order environmental attitudes model.

Table 11

Factor and Consistency Analysis of Environmental Attitudes

Specialization dimensions and items	*M*	*SD*	Factor Loadings
Limits to growth (Index Mean = 2.64)			
We are approaching the limit of the number of people the earth can support	2.66	1.29	0.65
Balance to nature (Index Mean = 3.39)			
When humans interfere with nature, it often produces disastrous consequences	3.31	1.30	0.70
The balance of nature is(n't) strong enough to cope with the impacts of modern industrial nations[a]	3.36	1.10	0.59
The balance of nature is delicate and easily upset	3.54	1.16	0.70
Anti-anthropocentricism (Index Mean = 3.42)			
Humans (do not) have the right to modify the natural environment to suit their needs[a]	3.35	1.26	0.63
Plants and animals have just as much right as humans to exist	3.80	1.25	0.59
Humans were (not) meant to rule over the rest of nature[a]	3.12	1.37	0.64

(table continues)

Specialization dimensions and items	*M*	*SD*	Factor Loadings
Anti-exemptionalism (Index Mean = 3.54)			
Human ingenuity will (not) insure that (~~we do not make~~) the earth (doesn't become) unlivable[a]	2.87	1.12	0.46
Despite our special attributes, humans are still subject to the laws of nature	4.23	0.79	0.40
Eco-crisis (Index Mean = 2.90)			
Humans are severely abusing the environment	3.16	1.28	0.74
The so-called "ecological crisis" facing humankind has (not) been greatly exaggerated[a]	2.67	1.18	0.74
If things continue on their present course, we will soon experience a major ecological catastrophe.	2.87	1.23	0.76

Note: Grand Mean = 3.24; Cronbach's α = 0.87; Eigenvalue = 4.93; Variance explained = 41.04; Index means include all three measures for that dimension.

[a] These variables were reverse scored. The statements have been modified (noted by parenthesis) so means above 3.0 indicate support with the statement and so that the statements can be interpreted directly.

we will soon experience a major ecological catastrophe" and 0.74 for the statements: "the so-called ecological crisis facing humankind has been greatly exaggerated" (reverse coded) and "humans are severely abusing the environment" to 0.40 for the statement: "despite our special attributes, humans are still subject to the laws of nature."

Parallel analysis tested a second-order model (i.e., the three distinct variables

intended to measure each of the five latent constructs loaded onto only its construct and then onto the environmental attitude construct). This model, however, was jettisoned due to its inconsistent application throughout the NEP literature and because the exploratory factor analysis did not identify the variables in a clear or consistent pattern across the constructs it is intended to measure (i.e., several ecological-crisis variables were correlated similarly to several balance of nature and anti-exemptionalism variables). In the end, the traditional single item approach to measure environmental attitudes is believed to be the most appropriate solution in this situation.

Utilizing a single factor model requires a high level of internal consistency defined by strong correlations to the factor (exhibited through high factor loadings), and an acceptable (≥ 0.70) value of coefficient α (Zeller & Carmines, 1980). The data obtained from Utah's OHV owners exhibited all three. Table 11 shows the consistency coefficient which was acceptable (Cronbach's $\alpha = 0.87$).

Environmental Attitudes Across Specialization Levels

Overall, off-highway vehicle owners showed a mean score slightly above neutral on the pro-environmental attitude scale (grand mean = 3.24), a finding that runs contrary to many public opinions directed toward the user group. Discrepancies were noticed throughout the five dimensions of the scale however, OHV owners while generally showing support for the anti-exemptionalism, balance to nature, and anti-anthropocentricism dimensions, showed disagreement with the statements aimed at measuring limits to growth and ecological crisis. These findings may suggest that the NEP scale, as a whole, is measuring too broad a construct to really assess how OHV

users see the human/environment relationship.

Returning now to all measured items on the NEP scale taken as an assessment of an individual's environmental attitude, no significant differences were exhibited across specialization groups (Table 12). This finding of no significant difference was obtained utilizing a one-way ANOVA ($F = 1.18$, $df = 2$, $p = .31$).

While no significant differences were noticed between groups, the realization that OHV owners exhibit a positive, albeit slightly, environmental attitude is noteworthy. If OHV owners at least have an awareness of environmental issues and topics, what then would lead to the group being largely perceived as uncaring about their environmental impact (Barringer & Yardley, 2007)? This contradiction raises obvious questions about the predictive validity of measuring attitudes. More specifically it raises questions about the NEP scale in particular. For example, is it too broad a measure to make any

Table 12

Environmental Attitudes Across Specialization Groups

Specialization Group	*M*	*SD*
Casual (*N* = 239)	3.28	0.76
Frequent (*N* = 61)	3.17	0.65
Experienced (*N* = 148)	3.17	0.81

definitive inferences about individuals or groups with regard to more specific attitudes and behaviors? The developers of the scale (Dunlap et al., 2000) cite frequent studies where significant relationships have been found between the NEP mean scores and

various types of behavioral intentions as well as both self-reported and observed behaviors (e.g., Blake et al., 1997; Ebreo et al., 1999; O'Connor et al., 1999; Roberts & Bacon, 1997; Schultz & Oskamp, 1996; Schultz & Zelezny, 1998; Scott & Willits, 1994; Stern et al., 1995; Tarrant & Cordell, 1997; Vining & Ebreo, 1992). They contend that the NEP scale therefore possesses a reliable amount of predictive validity (Dunlap et al., 2000).

The application of the NEP scale's ability to predict pro-environmental behavior among Utah's OHV owners should be perceived with caution. Substantial disassociations may be present between recreationists' general environmental worldview, as measured by the NEP scale, and their participation in an activity. The connection between environmental attitudes or beliefs, perceived impacts of recreation participation, and pro-environmental behavior will be further addressed in the future research considerations section of this thesis.

Validity and Consistency of Measured Leisure Motivations

Testing for internal consistency of the measured variables demonstrated there is a high level of consistency within the empirical measures for their respective domains (Cronbach's $\alpha \geq 0.62$). With six of the seven motivation domains exhibited Cronbach's $\alpha \geq 0.82$ and given the theoretical underpinnings from which the motivation dimensions have been drawn, these six domains can be said to be accurately represented by their measurements. Table 13 shows the consistency analysis as well as the mean scores and standard deviations for each measure.

Table 13

Factor and Consistency Analysis of Motivations for Riding

Motivation domains and measurements	*M*	*SD*
Stress relief and nature appreciation		
Index mean = 4.46; Cronbach's α = 0.83		
Enjoy natural scenery	4.68	0.65
Get away from the demands of life	4.60	0.69
Experience personal freedom	4.48	0.77
Experience solitude	4.30	0.87
Release or reduce built-up tension	4.22	0.92
Share similar values		
Index mean = 4.27; Cronbach's α = 0.82		
Be with other people who enjoy the same activities that I do	4.26	0.92
Be with members of my group	4.28	0.91
Achievement/stimulation		
Index mean = 3.83; Cronbach's α = 0.86		
Do something challenging	3.78	1.01
Enjoy a place that is special to me	4.30	0.84
Experience excitement	4.02	0.98
Develop my skills and abilities	3.80	1.05
Test the capabilities of my vehicle	3.25	1.19

(table continues)

Motivation domains and measurements	*M*	*SD*
Learn new things		
Index mean = 3.99; Cronbach's α = 0.62		
Experience new and different things	4.04	0.91
Learn more about the natural history of an area	3.95	0.94
Independence		
Index mean = 3.79; Cronbach's α = 0.87		
Do things my own way	3.70	1.03
Be in control of things that happen	3.90	1.01
Teach/lead others		
Index mean = 3.62; Cronbach's α = 0.90		
Help others develop their skills	3.69	0.96
Share what I have learned with others	3.82	0.93
Lead other people	3.35	1.02
Meet new people		
Index mean = 3.18; Cronbach's α = 0.89		
Talk to new and varied people	3.31	1.06
Observe other people in the area	3.06	1.15

Leisure Motivations Across Specialization Levels

When looking at the mean index scores for all seven of the motivation domains, one observation is that they are all positive, two even exhibited means above four on the

five-point scale. This indicates that OHV owners at-large view these motivations as important determinants when they go riding.

Table 14 displays the significance levels and mean scores for all seven domains. Important to note here are the nonsignificant findings. Four of the domains did not exhibit strong statistical differences (i.e., $p \leq .05$). These four domains were: stress relief and nature appreciation; sharing similar values; learning new things; and teaching or leading others.

Expected results would suggest that casual owners would exhibit lower motivations for stress relief and nature appreciation than the experienced group assuming the latter group would be more sensitive to the resource and the benefits that it provides to them. This expectation was not supported by the findings as shown by a comparison of the means in Table 14.

Expectations would be similar for the share similar values and teaching or leading others domain. The more specialized recreationists are, the more importance they place on not only how and where they recreate, but also with whom. Again, these expectations were not supported by the data.

The *learn new things* domain was not internally consistent (Cronbach's $\alpha = 0.62$), and therefore wasn't analyzed for differences between groups. The three domains to show significant ($p \leq .05$) differences between groups were: achievement/stimulation, independence, and meet new people. As expected, there was a strong positive correlation between advancement in specialization level and the importance of OHV riding to provide personal achievement/stimulation and a sense of independence.

The other significant difference revealed that meeting new people was more

important to the more specialized groups. This correlation seems counter intuitive given that those more advanced in the activity an individual is, the more likely they would be to have established enduring relationships that facilitate their continued participation in the activity. This implies that they would rather go OHV riding more often with those individuals whom they have gone with in the past. However, this does not appear to be the case. This finding, coupled with the mean differences across the teach/lead others domain explains that more specialized owners see exhibiting and sharing their knowledge about OHV riding more important than being with a group of other more advanced riders.

Table 14

Motivations for Riding Across Specialization Groups

	Specialization group				
	Casual	Frequent	Experienced	Significance[a]	
Motivation	*M (SD)*	*M (SD)*	*M (SD)*	χ^2	*p*
Stress relief and nature appreciation	4.47 (.55)	4.50 (.55)	4.59 (.50)	25.02	.405
Share similar values	4.26 (.77)	4.41 (.70)	4.35 (.82)	19.35	.152
Achievement/ stimulation	3.69 (.77)	4.00 (.64)	4.13 (.75)	67.43	.004
Independence	3.71 (.93)	3.91 (.76)	4.06 (.91)	28.74	.026
Teach/lead others	3.50 (.87)	3.81 (.80)	3.82 (.88)	28.05	.174
Meet new people	3.09 (1.03)	3.15 (1.02)	3.34 (1.09)	29.29	.022

[a] *df* = 8 for each chi-square test.

The other significant difference revealed that meeting new people was more important to the more specialized groups. This correlation seems counter intuitive given the more advanced in the activity individuals are, the more likely they would be to have established enduring relationships that facilitate their continued participation in the activity. This implies that they would rather go OHV riding more often with those individuals whom they have gone with in the past. However, this does not appear to be the case. This finding, coupled with the mean differences across the teach/lead others domain explains that more specialized owners see exhibiting and sharing their knowledge about OHV riding more important than being with a group of other more advanced riders.

CHAPTER V

DISCUSSION

This thesis examined relationships between OHV owners' specialization and their environmental attitudes and motivations for participating in the activity. Results showed the recreation specialization framework could successfully be applied to modern and motorized forms of recreation; however the degree to which OHV owners in Utah are psychologically attached to the activity remains largely undefined.[18] Environmental attitudes were not significantly different across the three identified specialization groups; however OHV owners did exhibit a slightly positive grand mean score, a finding that runs counter to many commonly held perceptions and stereotypes of the user group. Motivations for riding did differ significantly and predictably across three motivation domains. As a group, casual owners do not place as much importance as either the frequent and highly invested group or the focused and experienced group when it comes to experiencing a sense of achievement or stimulation from riding. This group also indicated relatively less importance in experiencing independence or the ability to teach or lead others than the other two groups. These findings have implications for the management of OHV use in Utah, more specifically how agency resources can be most efficiently used to satisfy the diverse and rapidly growing OHV ridership within the state. The findings also have implications for recreation theory and future research. Much has been learned about the recreation specialization framework in particular by applying it to a modern, motorized, and increasing important recreational activity. There are several ways in which this body of literature can be bettered and

[18] This is a fault primarily of the vagueness and ambiguity in how it has been applied and interpreted in the past.

expanded in the future. These points will be outlined in the theoretical implications and future research section shortly.

Management Implications

Given the explosive growth of OHV recreation within the state and land management agencies' tight recreation management budgets, research that is useful for planning and managing public lands efficiently and effectively is needed. With a knowledge that the recreation specialization framework can successfully be implemented to segment Utah's OHV owner population, planning and management efforts can focus on providing services and recreational activities that do not cater to a homogenous user group, but rather to the diverse population of OHV owners who lie along the specialization continuum.

Management should focus the majority of resources on the casual OHV owner; that is the recreationists who identify themselves as "intermediate" riders while preferring trails that do not require a lot of skill to navigate. Managers can also infer because these users make up the largest proportion of OHV owners in Utah, significant efforts should be made to facilitate and enhance their participation. An example of this facilitation may include an increased effort to make information available via web sites, field offices, or ranger stations geared toward those users who said they only use their OHV for recreational purposes less than five times per year. Another example of this facilitation toward the casual owner would be to make trailhead facilities accessible and accommodating (i.e., available restroom facilities, water, and camping areas) for a user that, relative to the more specialized groups, would not have camp trailers and "toy haulers" utilized for overnight trips.

In the design and development of OHV trails, managers need to be aware that the more populous casual owner prefers trails that do not require a significant amount of technical ability to navigate. As many recreation planners are moving to identifying segments of their trail systems by their difficulty level (e.g., moderate, more difficult, extreme), the majority of trail maintenance and future development should be focused on only moderately difficult trails.

The Bureau of Land Management notes in its most recent OHV management guidelines (Bureau of Land Management, 2001b) a "key action item" as "maintain[ing] a public outreach campaign promoting a new OHV user ethic to respect public land resources" (p. 8). With the knowledge Utah's OHV owners are sensitive to or at least aware of environmental issues, this "new OHV user ethic" may be more tangible and achievable than previously thought. With the findings brought forth by this research, it would be prudent for recreation managers to implement or increase public outreach and education campaigns that foster an increased environmental and land use ethic for OHV owners. Given the measures of the NEP and their references to the relationship between plants, wildlife, humans, and technology, these campaigns should focus on the environmental impacts that riding an OHV off roads or trails can potentially have. More specifically, the NEP scale refers to "laws and balance of nature," and to the "rights" of plants and animals to exist. These ideas were the most strongly supported by OHV owners[19] (see Appendix D). Because owners exhibited the strongest agreement with these statements, public outreach and environmental education campaigns may find valuable entrées into OHV owners' value systems if they are to refer to

[19] "Despite our special attributes, humans are still subject to the laws of nature" = 4.23 mean. "Plants and animals have as much right as humans to exist" = 3.80 mean. "The balance of nature is delicate and easily upset" = 3.54 mean. Where 1 = *strongly disagree* and 5 = *strongly agree*.

and strengthen these pro-environmental ideas that could potentially foster an increased environmental and land use ethic.

In conclusion, managers should realize that the state's OHV owners are not a homogenous group of recreationists and not should be planned for as such. Different opportunities for different types of OHV owners should be a priority if agencies are to deliver a broad spectrum of recreational opportunities (USDA Forest Service, 1990). Many agencies and OHV owner organizations have already begun to realize the different needs and desires within the OHV owner population. For example, Canyon Country 4x4 Club along with the UT/AZ OHV Club has worked in conjunction with the BLM's Kanab Field Office to construct, designate, and monitor the Hog Canyon OHV Trail System northeast of Kanab, UT (Bureau of Land Management, 2008). The system includes trails of varying difficulty to compliment a variety of OHV riders from younger children to the most experienced and adventurous. The system also complements the open riding area of Coral Pink Sand Dunes in eastern Kane County. This is just one example of how the diverse population of riders that OHV use attracts is beginning to be addressed on public lands in Utah.

Theoretical Implications and Future Research

This research set out with several important purposes, largely revolving around applying existing theories from environmental sociology and leisure sciences to the burgeoning activity of recreational OHV use. These purposes were all achieved even if results were not highly definitive.

Implications for Recreation Specialization

Bryan's conceptual framework has undergone subsequent analysis and refinement to examine its validity and applicability. The research and writings have expanded to reflect nearly three decades of study engaged in the understanding of its accuracy, power, and applicability (Bryan, 2001). If this framework is to maintain as a fundamental foundation for understanding the behaviors of recreationists, two explicit arenas for research must be furthered.

First, the conceptual framework must be applied to different recreational endeavors, like OHV use, across a broad range of types and complexity. Thus far, researchers have applied recreational specialization to many different types of activities, the vast majority of which have been oriented toward traditional outdoor recreation activities like boating, hiking, camping, and the wildlife based activities of birding, fishing, and hunting (Scott & Shafer, 2001). Applying the specialization framework to different and more modern recreational activities must be done to constantly refresh the framework and test its applicability. Its application to OHV use in this thesis has both provided empirical evidence for differences in OHV owners as well as deepened the specialization literature by reinforcing a fundamental precept of the framework (i.e., several unique types of recreationists that can be arranged on a continuum from the general to the particular).

Also pivotal to the maintenance of recreation specialization as a fundamental foundation for understanding the behaviors of recreationists, is the continued exploration into the process of progression within the spectrum. Most specialization research, like this thesis, has engaged specialization more as a snapshot view of recreational behavior, focusing on the current position of users within the continuum of involvement. This view tends to overlook

one of Bryan's initial observations, that specialization is "a process whereby individuals become increasingly skilled and committed to the leisure activity over time (Scott & Shafer, 2001).

There are several areas where future research should be involved. First, is the need to examine how, or even if, a progression or regression throughout the continuum takes place over time. Second, is the need to understand conditions that either foster or stall progression. This includes the study of support structures and opportunities that make progression possible or problematic (Scott & Shafer, 2001). These support structures could entail involvement in an unorganized user group such as friends or involvement in competition within the activity. Opportunities could be described as recreationists' geographic proximity to recreation opportunities or their ability to gather information about the activity. Potential future projects, albeit more involved and time consuming, could involve the establishment of a panel study of a particular group of recreationists. This would allow researchers to better understand how life events, time, and age, among a host of other variables, affect the individual's level of involvement over an extended duration.

Implications for OHV Use and Environmental Attitudes

The results show highly interesting observational results through the application of the NEP scale, which sheds new light onto the general understanding of OHV owners' values, attitudes and beliefs. The connection between the specialization framework and the emergence of a new ecological paradigm, at least in its application to OHV use, needs to be further refined to determine if more subtle associations are present.

Implications for OHV Use and Motivations

Given the general acceptance of the REP scales and their well researched validity and reliability (Driver & Bruns, 1999), any future research into the use of REP scales on Utah's OHV owners will be similar to that presented here. However this thesis only utilized a very small set of domains and measures from the vast catalogue (Canadian Parks/Recreation Association, 1997). Future research should examine more of these domains to obtain a more complete understanding of OHV owners' motivations for participation in the activity.

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APPENDICES

APPENDIX A

UTAH OFF-HIGHWAY VEHICLE REGISTRATIONS, 1998 – 2006

Table 15

Utah Off-Highway Vehicle Registrations (1998, 1999)

	1998			1999		
	Vehicle Type			Vehicle Type		
County	ATV, motor-cycle, etc.	Snow-mobile	Total	ATV, motor-cycle, etc.	Snow-mobile	Total
Beaver	271	62	333	406	55	461
Box Elder	1,479	1,055	2,534	2,368	1,073	3,441
Cache	1,759	1,970	3,729	2,812	2,233	5,045
Carbon	1,305	395	1,700	2,155	372	2,527
Daggett	41	25	66	94	37	131
Davis	5,102	3,442	8,544	7,539	3,591	11,130
Duchesne	340	162	502	542	179	721
Emery	869	105	974	1,074	102	1,176
Garfield	267	55	322	297	42	339
Grand	218	20	238	346	17	363
Iron	860	492	1,352	1,544	599	2,143
Juab	648	148	796	1,160	138	1,298
Kane	306	403	709	410	336	746
Millard	598	36	634	1,016	54	1,070

(table continues)

	1998			1999		
	Vehicle Type			Vehicle Type		
County	ATV, motor-cycle, etc.	Snow-mobile	Total	ATV, motor-cycle, etc.	Snow-mobile	Total
Morgan	458	343	801	734	446	1,180
Piute	104	15	119	156	11	167
Rich	78	156	234	149	189	338
Salt Lake	15,747	6,526	22,273	23,776	6,449	30,225
San Juan	295	47	342	435	29	464
Sanpete	1,346	509	1,855	2,540	597	3,137
Sevier	1,709	307	2,016	2,884	300	3,184
Summit	555	914	1,469	890	1,073	1,963
Tooele	1,210	333	1,543	2,611	490	3,101
Uintah	844	374	1,218	1,294	386	1,680
Utah	8,637	3,777	12,414	12,839	3,837	16,676
Wasatch	464	894	1,358	933	1,037	1,970
Washington	1,654	342	1,996	2,637	300	2,937
Wayne	124	24	148	205	17	222
Weber	4,398	2,892	7,290	6,623	3,103	9,726
Total	51,686	25,823	77,509	80,469	27,092	107,561

Table 16

Utah Off-Highway Vehicle Registrations (2000, 2001)

	2000			2001 (adjusted due to transition)		
	Vehicle Type			Vehicle Type		
County	ATV, motor-cycle, etc.	Snow-mobile	Total	ATV, motor-cycle, etc.	Snow-mobile	Total
Beaver	470	68	538	481	58	539
Box Elder	2,767	1,117	3,884	3,160	1,166	4,326
Cache	3,275	2,265	5,540	3,487	2,386	5,873
Carbon	2,406	401	2,807	2,477	428	2,905
Daggett	89	34	123	94	47	141
Davis	8,548	3,933	12,481	8,560	4,196	12,756
Duchesne	645	219	864	710	235	945
Emery	1,218	98	1,316	1,249	122	1,371
Garfield	359	39	398	353	42	395
Grand	451	28	479	446	30	476
Iron	1,746	584	2,330	1,849	706	2,555
Juab	1,304	141	1,445	1,383	155	1,538
Kane	428	336	764	499	248	747
Millard	1,313	49	1,362	1,401	51	1,452

(table continues)

	2000			2001 (adjusted due to transition)		
	Vehicle Type			Vehicle Type		
County	ATV, motor-cycle, etc.	Snow-mobile	Total	ATV, motor-cycle, etc.	Snow-mobile	Total
Morgan	817	430	1,247	937	464	1,401
Piute	184	14	198	195	17	212
Rich	156	164	320	152	182	334
Salt Lake	26,226	7,425	33,651	26,060	6,979	33,039
San Juan	516	22	538	602	26	628
Sanpete	2,697	610	3,307	2,594	633	3,227
Sevier	3,327	248	3,575	3,523	288	3,811
Summit	1,065	1,132	2,197	1,185	1,252	2,437
Tooele	3,097	488	3,585	3,509	474	3,983
Uintah	1,535	362	1,897	1,726	414	2,140
Utah	15,014	4,062	19,076	16,948	4,452	21,400
Wasatch	1,097	1,147	2,244	1,261	1,286	2,547
Washington	3,133	258	3,391	3,192	311	3,503
Wayne	238	15	253	277	22	299
Weber	7,475	3,296	10,771	7,259	3,394	10,653
Total	91,596	28,985	120,581	95,569	30,064	125,633

Table 17

Utah Off-Highway Vehicle Registrations (2002, 2003)

	2002			2003		
	Vehicle Type			Vehicle Type		
County	ATV, motor-cycle, etc.	Snow-mobile	Total	ATV, motor-cycle, etc.	Snow-mobile	Total
Beaver	712	51	763	656	20	676
Box Elder	3,907	1,241	5,148	3,887	931	4,818
Cache	4,420	2,585	7,005	4,349	1,864	6,213
Carbon	2,811	414	3,225	2,631	317	2,948
Daggett	152	68	220	171	61	232
Davis	12,913	4,449	17,362	12,718	3,477	16,195
Duchesne	1,073	316	1,389	1,074	253	1,327
Emery	1,961	139	2,100	1,822	113	1,935
Garfield	585	46	631	569	40	609
Grand	694	32	726	697	25	722
Iron	2,399	559	2,958	2,431	440	2,871
Juab	1,516	193	1,709	1,424	153	1,577
Kane	777	326	1,103	873	270	1,143
Millard	1,558	44	1,602	1,578	38	1,616

(table continues)

	2002			2003		
	Vehicle Type			Vehicle Type		
County	ATV, motor-cycle, etc.	Snow-mobile	Total	ATV, motor-cycle, etc.	Snow-mobile	Total
Morgan	1,140	497	1,637	1,110	386	1,496
Piute	256	17	273	281	15	296
Rich	209	228	437	219	175	394
Salt Lake	35,662	7,971	43,633	34,124	6,428	40,552
San Juan	877	37	914	825	26	851
Sanpete	3,060	604	3,664	2,969	459	3,428
Sevier	3,819	289	4,108	3,708	198	3,906
Summit	1,740	1,273	3,013	1,625	826	2,451
Tooele	3,518	440	3,958	3,494	387	3,881
Uintah	2,446	478	2,924	2,619	395	3,014
Utah	21,664	4,974	26,638	21,042	3,940	24,982
Wasatch	1,492	1,410	2,902	1,335	1,073	2,408
Washington	4,921	379	5,300	5,289	283	5,572
Wayne	344	40	384	341	30	371
Weber	10,930	3,880	14,810	11,093	3,204	14,297
Total	127,556	32,980	160,536	124,954	25,827	150,781

Table 18

Utah Off-Highway Vehicle Registrations (2004, 2005)

	2004			2005		
	Vehicle Type			Vehicle Type		
County	ATV, motor-cycle, etc.	Snow-mobile	Total	ATV, motor-cycle, etc.	Snow-mobile	Total
Beaver	860	36	896	754	37	791
Box Elder	4,910	1,265	6,175	4,591	1,039	5,630
Cache	5,668	2,530	8,198	5,419	2,016	7,435
Carbon	3,361	425	3,786	3,109	323	3,432
Daggett	227	70	297	215	46	261
Davis	16,462	4,551	21,013	15,031	3,847	18,878
Duchesne	1,482	370	1,852	1,438	301	1,739
Emery	2,310	160	2,470	2,045	115	2,160
Garfield	745	56	801	772	50	822
Grand	936	40	976	889	36	925
Iron	3,322	636	3,958	3,475	455	3,930
Juab	1,807	219	2,026	1,652	183	1,835
Kane	1,167	344	1,511	1,088	279	1,367
Millard	2,016	47	2,063	1,925	29	1,954

(table continues)

	2004			2005		
	Vehicle Type			Vehicle Type		
County	ATV, motor-cycle, etc.	Snow-mobile	Total	ATV, motor-cycle, etc.	Snow-mobile	Total
Morgan	1,392	555	1,947	1,290	431	1,721
Piute	367	22	389	359	8	367
Rich	297	249	546	314	160	474
Salt Lake	42,827	8,297	51,124	39,593	6,645	46,238
San Juan	1,039	58	1,097	948	46	994
Sanpete	3,885	630	4,515	3,703	576	4,279
Sevier	4,554	337	4,891	4,256	253	4,509
Summit	2,239	1,305	3,544	2,046	1,095	3,141
Tooele	4,637	516	5,153	4,363	404	4,767
Uintah	3,635	586	4,221	3,646	464	4,110
Utah	26,770	5,183	31,953	25,662	4,347	30,009
Wasatch	1,803	1,425	3,228	1,763	1,266	3,029
Washington	7,876	415	8,291	8,881	300	9,181
Wayne	462	44	506	455	43	498
Weber	14,294	4,128	18,422	13,159	3,427	16,586
Total	161,350	34,499	195,849	152,841	28,221	181,062

Table 19

Utah Off-Highway Vehicle Registrations (2006)

	2006		
	Vehicle Type		
County	ATV, motor-cycle, etc.	Snow-mobile	Total
Beaver	831	53	884
Box Elder	5,084	1,040	6,124
Cache	5,805	1,897	7,702
Carbon	3,475	284	3,759
Daggett	252	47	299
Davis	16,824	3,907	20,731
Duchesne	1,890	313	2,203
Emery	2,163	117	2,280
Garfield	888	51	939
Grand	948	39	987
Iron	4,160	481	4,641
Juab	1,939	182	2,121
Kane	1,267	286	1,553
Millard	2,115	49	2,164

(table continues)

	2006		
	Vehicle Type		
County	ATV, motor-cycle, etc.	Snow-mobile	Total
Morgan	1,421	464	1,885
Piute	375	7	382
Rich	357	159	516
Salt Lake	43,514	6,821	50,335
San Juan	986	43	1,029
Sanpete	4,188	569	4,757
Sevier	4,602	269	4,871
Summit	2,410	1,272	3,682
Tooele	5,144	420	5,564
Uintah	4,276	524	4,800
Utah	29,219	4,409	33,628
Wasatch	2,137	1,251	3,388
Washington	10,884	358	11,242
Wayne	528	48	576
Weber	14,441	3,359	17,800
Total	172,123	28,719	200,842

Table 20

Changes in Utah OHV Registrations from 1998-2006

	Vehicle Type		
County	ATV, motorcycle, etc.	Snow-mobile	Total
Beaver	178.23%	-40.32%	137.54%
Box Elder	210.41%	-1.52%	122.18%
Cache	208.07%	2.34%	99.38%
Carbon	138.24%	-18.23%	101.88%
Daggett	424.39%	84.00%	295.45%
Davis	194.61%	11.77%	120.95%
Duchesne	322.94%	85.80%	246.41%
Emery	135.33%	9.52%	121.77%
Garfield	189.14%	-9.09%	155.28%
Grand	307.80%	80.00%	288.66%
Iron	304.07%	-7.52%	190.68%
Juab	154.94%	23.65%	130.53%
Kane	255.56%	-30.77%	92.81%
Millard	221.91%	-19.44%	208.20%
Morgan	181.66%	25.66%	114.86%
Piute	245.19%	-46.67%	208.40%
Rich	302.56%	2.56%	102.56%

(table continues)

	Vehicle Type		
County	ATV, motorcycle, etc.	Snow-mobile	Total
Salt Lake	151.43%	1.82%	107.60%
San Juan	221.36%	-2.13%	190.64%
Sanpete	175.11%	13.16%	130.67%
Sevier	149.03%	-17.59%	123.66%
Summit	268.65%	19.80%	113.82%
Tooele	260.58%	21.32%	208.94%
Uintah	331.99%	24.06%	237.44%
Utah	197.12%	15.09%	141.74%
Wasatch	279.96%	41.61%	123.05%
Washington	436.94%	-12.28%	359.97%
Wayne	266.94%	79.17%	236.49%
Weber	199.20%	18.50%	127.52%
Total	195.71%	9.29%	133.60%

APPENDIX B

RECREATION SPECIALIZATION LITERATURE CATALOG

Table 21

Previous Dimensions and Measurements of Specialization (Organized by Dimension)

Dimension; Components; Specific Measures
Behavior; Preferences; Equipment (Bryan, 1977; Chipman & Helfrich, 1988; Martin, 1997).
Behavior; Preferences; Outcome (e.g., size and species of fish over quantity or vice-versa) (Bryan, 1977; Chipman & Helfrich, 1988; Fisher, 1997; Miller & Graefe, 2000)Resource (e.g., small streams over lakes or vice-versa) (Bryan, 1977; Chipman & Helfrich, 1988).
Behavior; Preferences; Management (e.g., stocking versus habitat management) (Bryan, 1977).
Behavior; Preferences; Social Setting (Bryan, 1977; Chipman & Helfrich, 1988; Miller & Graefe, 2000).
Behavior; Preferences; For the activity over other activities (also noted as a dimension of commitment) (Lee & Scott, 2004; Miller & Graefe, 2000).
Behavior; History; “Cumulative response” (A “cumulative response” was defined as “when the individual reported starting with rudimentary tackle (e.g., cane pole and worms) in his early experiences, progressing to lures cast with spinning or spin-cast tackle at a later stage, then progressing to fly-fishing equipment still later.” (Bryan, 1977, p. 182)).

(table continues)

Dimension; Components; Specific Measures

Behavior; History; Lifetime number of trips (Bricker & Kerstetter, 2000; Kuentzel & McDonald, 1992).

Behavior; History; Trips within the past 5 years (Bricker & Kerstetter, 2000; Dyck et al, 2003).

Behavior; History; Years involved in the activity (Chipman & Helfrich, 1988; Thapa et al, 2006; Fisher, 1997; Donnelly et al, 1986; Kuentzel & Heberlein, 1997; Kuentzel & McDonald, 1992; McFarlane, 2004; Needham et al, 2007; Hvenegaard, 2002; Dyck et al, 2003).

Behavior; History; Frequency of trips over the recreationist's lifetime (Kuentzel & Heberlein, 1997; Kuentzel & McDonald, 1992).

Behavior; History; Lifetime trips completed (Thapa et al, 2006; Wellman, Roggenbuck, & Smith, 1982; Dyck et al, 2003).

Behavior; History; Trips within the past year (Chipman & Helfrich, 1988; Oh & Ditton, 2006; Thapa et al, 2006; Lee & Scott, 2004; Cole & Scott, 1999; Kuentzel & Heberlein, 1997; Martin, 1997; Scott et al, 2005; Lee & Scott, 2004; Lee & Scott, 2006; Scott & Thigpen, 2003; Wellman et al, 1982; Burr & Scott, 2005).

(table continues)

Dimension; Components; Specific Measures

Behavior; History; Days recreating within the past year (Oh & Ditton, 2006; Fisher, 1997; Oh, Ditton, Anderson, Scott, & Stoll, 2005; Lee & Scott, 2004; Ditton et al, 1992; Donnelly et al, 1986; Kuentzel & Heberlein, 1997; Scott et al, 2005; McFarlane, 1994; Lee & Scott, 2006; Miller & Graefe, 2000; Scott & Thigpen, 2003; Hvenegaard, 2002; Burr & Scott, 2005).

Behavior; History; Months per year involved in the activity (Cole & Scott, 1999).

Behavior; History; Years of experience with a specific site (Chipman & Helfrich, 1988).

Behavior; History; Frequency of recreating at a specific site (Chipman & Helfrich, 1988; Thapa et al, 2006; Oh et al, 2005; Kuentzel & Heberlein, 2006; McFarlane, 2004).

Behavior; History; Number of different places recreated at over lifetime (Thapa et al, 2006; Kuentzel & McDonald, 1992; McFarlane, 2004; Wellman et al, 1982; Dyck et al, 2003; Bricker & Kerstetter, 2000).

Behavior; History; Participates in the activity at home (Cole & Scott, 1999).

Behavior; History; Years since first visit to a specific site (McFarlane, 2004).

Behavior; History; Days of preparation for the activity (Miller & Graefe, 2000).

Behavior; Equipment and Investment; Overall investment in equipment (Bricker & Kerstetter, 2000; Chipman & Helfrich, 1988; Kuentzel & McDonald, 1992; Schroder et al, 2006; Needham et al, 2007; Wellman et al, 1982; Hvenegaard, 2002; Dyck et al, 2003).

(table continues)

Dimension; Components; Specific Measures

Behavior; Equipment and Investment; Replacement value of equipment (Oh & Ditton, 2006; Oh et al, 2005; Scott et al, 2005; McFarlane, 1994)

Behavior; Equipment and Investment; Overall investment in related expenses (Bricker & Kerstetter, 2000; Kuentzel & McDonald, 1992; Dyck et al, 2003)

Behavior; Equipment and Investment; Number of activity-specific items owned (Bricker & Kerstetter, 2000; Chipman & Helfrich, 1988; Donnelly et al, 1986; Kuentzel & Heberlein, 2006; McFarlane, 1994; Miller & Graefe, 2000; Schroder et al, 2006; Wellman et al, 1982; Hvenegaard, 2002; Dyck et al, 2003).

Behavior; Equipment and Investment; Year boats were purchased (Bricker & Kerstetter, 2000).

Behavior; Equipment and Investment; Number of different kinds of boats owned (Bricker & Kerstetter, 2000).

Behavior; Equipment and Investment; Yearly expenditures (Cole & Scott, 1999; Wellman et al, 1982).

Behavior; Skill/Abilities; Self-reported skill level (Bricker & Kerstetter, 2000; Oh & Ditton, 2006; Thapa et al, 2006; Oh et al, 2005; Cole & Scott, 1999; Kuentzel & Heberlein, 2006; Kuentzel & Heberlein, 1997; Kuentzel & McDonald, 1992; Scott et al, 2005; Lee & Scott, 2004; McFarlane, 1994; Lee & Scott, 2006; McFarlane, 2004; Miller & Graefe, 2000; Needham et al, 2007; Salz & Loomis, 2005; Salz et al, 2001; Dyck et al, 2003).

(table continues)

Dimension; Components; Specific Measures

Behavior; Skill/Abilities; Confidence level in the activity (Thapa et al, 2006; Salz et al, 2001).

Behavior; Skill/Abilities; Specific activity related abilities (Thapa et al, 2006; Lee & Scott, 2004; Kuentzel & Heberlein, 1997; Martin, 1997; Lee & Scott, 2004; McFarlane, 1994; Lee & Scott, 2006; Scott & Thigpen, 2003; Burr & Scott, 2005; Dyck et al, 2003).

Behavior; Skill/Abilities; Self-reported knowledge level (Thapa et al, 2006; Salz & Loomis, 2005).

Behavior; Skill/Abilities; Ability to adapt to different situations within the activity (Thapa et al, 2006).

Behavior; Skill/Abilities; Certification level (Thapa et al, 2006; Donnelly et al, 1986).

Behavior; Skill/Abilities; Constraint level of developing skill or continued participation (Oh & Ditton, 2006; Kuentzel & Heberlein, 2006).

Behavior; Skill/Abilities; Highest level of activity-specific difficulty completed (Bricker & Kerstetter, 2000).

Behavior; Skill/Abilities; Importance of developing skills/abilities (Kuentzel & McDonald, 1992; Needham et al, 2007).

(table continues)

Dimension; Components; Specific Measures

Commitment; Centrality; "relationship of the leisure activity to other areas of life (family, career, other leisure activities)" (Bryan, 1977, p. 177; Oh & Ditton, 2006; Lee & Scott, 2004; Kuentzel & Heberlein, 1997; Kuentzel & McDonald, 1992; Lee & Scott, 2006; McFarlane, 2004; Miller & Graefe, 2000; Schroder et al, 2006; Hvenegaard, 2002; Dyck et al, 2003).

Commitment; Centrality; Distance traveled to recreate (Bryan, 1977; Chipman & Helfrich, 1988; McFarlane, 1994).

Commitment; Centrality; Vacation patterns (e.g., extended versus short) (Bryan, 1977; Chipman & Helfrich, 1988).

Commitment; Centrality; Leisure priority (e.g., career influenced by recreation or not) (Bryan, 1977).

Commitment; Centrality; Membership to clubs (Bricker & Kerstetter, 2000; Chipman & Helfrich, 1988; Oh & Ditton, 2006; Thapa et al, 2006; Oh et al, 2005; Donnelly et al, 1986; Kuentzel & McDonald, 1992; Martin, 1997; Scott et al, 2005; Miller & Graefe, 2000; Wellman et al, 1982; Dyck et al, 2003).

Commitment; Centrality; Subscription to activity-specific magazines (Bricker & Kerstetter, 2000; Chipman & Helfrich, 1988; Thapa et al, 2006; Donnelly et al, 1986; McFarlane, 1994; Wellman et al, 1982).

Commitment; Centrality; Books read related to the activity (Bricker & Kerstetter, 2000; McFarlane, 1994; Wellman et al, 1982; Dyck et al, 2003).

(table continues)

Dimension; Components; Specific Measures

Commitment; Centrality; Participation in competition events (Oh et al, 2005; Kuentzel & Heberlein, 2006; Kuentzel & Heberlein, 1997).

Commitment; Centrality; Participation in trips that require experience and advanced skill (Kuentzel & Heberlein, 1997).

Commitment; Centrality; Dependence of personal relationships on the activity (Lee & Scott, 2004; Kuentzel & Heberlein, 1997; Lee & Scott, 2006; McFarlane, 2004; Schroder et al, 2006; Salz & Loomis, 2005; Salz et al, 2001; Dyck et al, 2003).

Commitment; Centrality; Level of distress if the activity were no longer possible (Lee & Scott, 2004; Kuentzel & Heberlein, 1997; Lee & Scott, 2006; Schroder et al, 2006; Needham et al, 2007).

Commitment; Centrality; Level of interest/involvement in the activity (Kuentzel & Heberlein, 2006; Kuentzel & Heberlein, 1997; Lee & Scott, 2006; McFarlane, 1994; McFarlane, 2004; Wellman et al, 1982; Burr & Scott, 2005).

Commitment; Centrality; Reflection of whether the activity is worth it's costs (Kuentzel & Heberlein, 1997).

Commitment; Centrality; The activity is an annual tradition (Needham et al, 2007).

Commitment; Centrality; Ease of finding another activity to replace their current one (Needham et al, 2007).

(table continues)

Dimension; Components; Specific Measures

Commitment; Enduring Involvement; Agreement/disagreement with statements asking if the activity brings enjoyment to the recreationist (Bricker & Kerstetter, 2000; Thapa et al, 2006; McFarlane, 2004; McIntyre, 1989).
Commitment; Enduring Involvement; Agreement/disagreement with statements asking if the activity is important to the recreationist (Bricker & Kerstetter, 2000; Thapa et al, 2006; Kuentzel & McDonald, 1992; Scott et al, 2005; McFarlane, 2004; McIntyre, 1989; Miller & Graefe, 2000; Scott & Thigpen, 2003; Needham et al, 2007).
Commitment; Enduring Involvement; Agreement/disagreement with statements asking if the activity allows the recreationist to express themselves (Bricker & Kerstetter, 2000; Thapa et al, 2006; McFarlane, 2004; McIntyre, 1989).
Commitment; Enduring Involvement; Agreement/disagreement with statements asking if the activity was central to the recreationists lifestyle (Bricker & Kerstetter, 2000; Thapa et al, 2006; McFarlane, 2004; McIntyre, 1989; Scott & Thigpen, 2003; Needham et al, 2007; Salz & Loomis, 2005; Salz et al, 2001).

Table 22

Previous Dimensions and Measurements of Specialization (Organized by Paper)

Dimensions	Way in which the dimension was measured
Bryan, 1977; trout fishermen	
"fishing preferences" (p. 177)	• Preference for a certain type of fishing equipment over another • Preference for certain outcomes over others (e.g., size over quantity or vice-versa) • Preference for certain species over others
"orientation toward the stream resource" (p. 177)	• Preference for certain waters over others (e.g., small streams over lakes or vice-versa) • Management preferences (e.g., stocking versus habitat management)
"history of interest and activity in the sport" (p. 177)	• Individuals either had a "cumulative response" or not. A "cumulative response" was defined as "when the individual reported starting with rudimentary tackle (e.g., cane pole and worms) in his early experiences, progressing to lures cast with spinning or spin-cast tackle at a later stage, then progressing to fly-fishing equipment still later" (p. 182).

(table continues)

Dimensions	Way in which the dimension was measured
"relationship of the leisure activity to other areas of life (family, career, other leisure activities)" (p. 177)	• Preference for social setting while fishing (e.g., with family, with friends, alone, etc.) • Distance traveled to fish • Vacation patterns (e.g., extended versus short) • Leisure priority (e.g., career influenced by recreation or not)
Wellman et al, 1982; Canoeists	
"investments" (p. 330)	• Amount invested in equipment • Amount spent within the past year • No. of canoeing items owned
"centrality" (p.330)	• Club membership • Magazine subscriptions • Book ownership • Self-identified level of involvement
"experience" (p. 330)	• Total lifetime canoe trips • Avg. no. of canoe trips per year • No. of rivers canoed
Donnelly et al, 1986; Motorized boaters	
"participation" (p. 87)	• No. of years of boating experience • No. of days boating last season

(table continues)

Dimensions	Way in which the dimension was measured
"equipment" (p. 87)	• Ownership of specific boating items
	• No. of boats owned
"skill" (p. 87)	• Self-identified skill level
	• Completion of a boater education course
"related interests" (p. 87)	• Magazine subscriptions
	• Boat club memberships
Chipman & Helfrich, 1988; River anglers	
"resource use" (p. 392)	• Type of equipment used
	• Preference for equipment
	• Preference for setting
	• Preference of species caught
"experience" (p.392)	• Years angling
	• Fishing frequency
	• Years of experience on-site
	• Frequency of fishing on-site
Chipman & Helfrich, 1988; River anglers	
"investments" (p.392)	• Amount of equipment owned
	• Amount invested in angling

(table continues)

Dimensions	Way in which the dimension was measured
"centrality" (p.392)	• Club membership • Magazine subscriptions • Preference for social setting • Maximum distance traveled to fish • Duration of fishing vacations • Agreement with 10 centrality statements
Virden & Schreyer, 1988; Back-country hikers	
general experience	• Unable to define measures
recent experience	• Unable to define measures
equipment and economic commitment	• Unable to define measures
centrality to lifestyle	• Unable to define measures
McIntyre, 1989[a]; Beach campers	
"enjoyment" (p. 172)	• Extent to which camping offers a release from life's pressures • Satisfaction with camping • Enjoyment with camping
"importance" (p. 172)	• Enjoyment of discussing camping with friends • Interest level in camping • Importance of camping

(table continues)

Dimensions	Way in which the dimension was measured
"self-expression" (p. 172)	• Agreement/disagreement with four statements revolving around the extent to which camping is tied to the recreationist's identity
"centrality" (p. 172)	• Extent to which life is organized around camping • Extent to which friends are involved in camping
Ditton, et al, 1992[b]; Saltwater sport anglers	
"frequency of participation" (p. 42)	• Number of days fishing over the past 12 months
Kuentzel & Heberlein, 1992; Hunters	
experience	• Unable to define measures
commitment	• Unable to define measures
media involvement	• Unable to define measures
membership in an organization	• Unable to define measures
hunting style	• Unable to define measures

(table continues)

Dimensions	Way in which the dimension was measured
Kuentzel & McDonald, 1992; River users	
No dimensions identified, rather eleven variables were combined in an additive measure of specialization	• Years of participation • Self-identified skill • No. of different rivers run • Total trips made • Hardware expenditures • Frequency of participation • Software expenditures • Club memberships • Importance of the activity • Percent of leisure time devoted to the activity • Importance of developing skills and abilities.
McIntyre & Pigram , 1992; Vehicle-based campers	
"experience"	• Unable to define measures
"familiarity"	• Unable to define measures
"attraction"	• Unable to define measures
"self-expression"	• Unable to define measures
"centrality"	• Unable to define measures
Ewert & Hollenhorst, 1994; Adventure recreationists	
"history"	• Unable to define measures

(table continues)

Dimensions	Way in which the dimension was measured
"skill"	• Unable to define measures
"involvement"	• Unable to define measures
"locus of control"	• Unable to define measures
McFarlane, 1994; Birdwatchers	
"past experience" (p. 363)	• No. of days birding over the past 12 months • Farthest distance traveled to go birding over the past 12 months • Self-identified level of personal involvement • Perceived skill-level • Ability to identify birds
McFarlane, 1994; Birdwatchers	
"commitment" (p. 363)	• No. of species on "life list" (p. 364) • No. of birding magazine subscriptions • No. of birding books read/owned
"centrality" (p. 363)	• No. of equipment items owned • Replacement value of equipment

(table continues)

Dimensions	Way in which the dimension was measured
Scott & Godbey, 1994; Contract bridge	
No dimensions identified, rather key-informant interviews were conducted to differentiate different player types	• Study was qualitative
Watson, Niccolucci, & Williams, 1994; Hikers and recreational stock users	
intensity of activity	• Unable to define measures
activity associated status	• Unable to define measures
experience	• Unable to define measures
importance of solitude	• Unable to define measures
Shafer & Hammitt, 1995; Day-hiking and backpacking	
attitudes toward wilderness ideals	• Unable to define measures
McFarlane, 1996; Birdwatchers	
"experience"	• Unable to define measures
"economic commitment"	• Unable to define measures
"centrality"	• Unable to define measures
McFarlane & Boxall, 1996; Birdwatchers	
"experience"	• Unable to define measures
"economic commitment"	• Unable to define measures

(table continues)

Dimensions	Way in which the dimension was measured
"centrality"	• Unable to define measures
Fisher, 1997; Fishermen	
no dimensions identified, rather cluster analysis on six variables was performed (p. 4)	• Years of fishing experience • Days fishing in the past 12 months • Importance of no. of fish caught • Importance of size of fish caught • Importance of catch disposition (e.g., keep or catch and release) • Importance of catching something
Kuentzel & Heberlein, 1997; Sail-boaters	
"experience and frequency of participation" (p. 309)	• Total years of sailing experience • The regularity of sailing over the years • A combined measure of the typical number of sailing trips one takes and days spent sailing each year • Self-identified measure of skill
"specialized boating behaviors" (p. 309)	• Frequency of participation in sailing races • No. of years respondents had sailed in boats that have overnight accommodations • No. of times the respondent has taken long-distance trips over open-water

(table continues)

Dimensions	Way in which the dimension was measured
"evaluations of the sailing experience" (p. 309) "commitment to sailing" (p. 309)	• Knowledge about or familiarity with 21 sailing related experiences • Respondents feelings if sailing were no longer a recreational opportunity in their lives • Rating of personal interest in boating • Reflection on whether boating was worth it's costs • Frequency of boating influencing other areas of one's life • No. of friends or relatives who were also boaters
Martin, 1997; Wildlife viewers No dimensions identified, rather four dichotomous variables were analyzed	• Trips within the past 12 months • Studies bird behavior and habitat • Use of specialized equipment • Participation in group activity

(table continues)

Dimensions	Way in which the dimension was measured
Cole & Scott, 1999; Wildlife watchers	
No dimensions identified, rather six variables were analyzed	• Skill • No. of trips per year • Months per year spent birding • Yearly expenditures • Whether or not the respondent feeds birds at home • Whether or not the respondent watches birds at home
Bricker & Kerstetter, 2000; Whitewater recreationists	
"level of experience" (p. 239)	• Lifetime number of trips w/ & w/o guide • Trips within the past 5 years w/ & w/o guide
"skill level and ability" (p. 239)	• Self-reported skill level • Highest class of whitewater difficulty completed w/ & w/o guide • No. of rivers rafted/kayaked w/ & w/o guide
Bricker & Kerstetter, 2000; Whitewater recreationists	
"centrality to lifestyle" (p. 239)	• Membership to paddling clubs • Subscription to whitewater/paddling magazines • Books read related to whitewater/paddling

(table continues)

Dimensions	Way in which the dimension was measured
"enduring involvement" (p. 240)	• Agreement/disagreement with 4 statements asking if the activity brings enjoyment to the recreationist • Agreement/disagreement with 3 statements asking if the activity is important to the recreationist • Agreement/disagreement with 3 statements asking if the activity allows the recreationist to express themselves • Agreement/disagreement with 2 statements asking if the activity was central to the recreationists lifestyle
"equipment and investment" (p. 239)	• Overall investment in equipment • Overall investment in related expenses • Number of related whitewater items owned • Year boats were purchased • Number of boats owned • Number of different kinds of boats owned
Miller & Graefe, 2000; Hunters "participation" (p. 198)	• Days of preparation for specific types of hunting • Days of preparation for all hunting • Days engaged in specific types of hunting • Days engaged in all hunting

(table continues)

Dimensions	Way in which the dimension was measured
"skill" (p. 198)	• Self-assessment of skill level • Amount of game harvested
"lifestyle" (p. 198)	• Desire to hunt alone if no partner is available • Importance of hunting • Extent to which hunting determines lifestyle • Preference for hunting over any other form of recreation • Membership in an organization
"equipment" (p.198)	• Amount of equipment owned relative to specific types of hunting
Scott & Shafer, 2001; No specific activity analyzed, rather this paper lays out the problems with and opportunities for future specialization research	
"behavior" (p. 326)	• No empirical evidence collected
"skills and knowledge" (p. 326)	• No empirical evidence collected
Scott & Shafer, 2001	
"commitment to the activity to the extent that it becomes a central to a recreationist's lifestyle (p. 326)	• No empirical evidence collected

(table continues)

Dimensions	Way in which the dimension was measured
Salz et al, 2001; Anglers	
"orientation" (p. 245)	• Selection from a list of four statements concerning respondents' place within the fishing world (e.g., outsider to insider)
"experience" (p. 245)	• Selection from a list of four statements concerning respondents' familiarity with fishing
"relationship" (p. 245)	• Selection from a list of four statements concerning respondents' relationships to other fishermen
"commitment" (p. 245)	• Selection from a list of four statements concerning respondents' commitment to the activity
Hvenegaard, 2002; Bird watchers	
"Economic commitment" (p. 26)	• Cost of equipment • Number of equipment items • Number of years birding
"Centrality to lifestyle" (p. 26)	• Number of birding days last year • Proportion of birding days to travel days
Scott & Thigpen, 2003; Bird watchers	
"behavior" (p. 204)	• No. of birding trips in the past 12 months • No. of days birding in the past 12 months

(table continues)

Dimensions	Way in which the dimension was measured
"skill" (p. 204)	• Birds identifiable by sound • Birds identifiable by sight
"equipment" (p. 204)	• Five items soliciting respondents about the importance/pleasure of birding • Nine items soliciting respondents about the degree to which birding played a central role in their lives
Dyck et al, 2003; Mountaineering	
"experience" (p. 49)	• No. of trips within the past five years • No. of years mountaineering • No. of lifetime trips • No. of different climbs completed within the past five years
"economic investment" (p. 49)	• Amount spent on mountaineering activities *excluding* equipment over the past two years • Amount invested over the lifetime • No. of specific equipment items owned
"skill level" (p. 49)	• Self-identified skill level in 14 skill areas • Self-identified overall skill level • No. of specific peaks/climbs completed

(table continues)

Dimensions	Way in which the dimension was measured
"centrality to lifestyle" (p. 49)	• Extent to which life was organized around mountaineering • Extent to which their friends are connected to mountaineering • Membership in an organization • No. of mountaineering books owned • Mountaineering's importance relative to other activities
Lee & Scott, 2004; Birdwatchers	
"behavior" (p. 252)	• Trips within the past 12 months • Days spent birding within the past 12 months
"skills and knowledge" (p. 252)	• No. of birds identifiable w/o field guide • No. of birds identifiable by sound • Self-identified skill level

(table continues)

Dimensions	Way in which the dimension was measured

"commitment" (p. 252)	• Agreement/Disagreement with the following statements:
	  ○ Other leisure activities don't interest me as much as birding
	  ○ If I couldn't go birding, I am not sure what I would do
	  ○ If I stopped birding, I would probably lose touch with a lot of my friends
	• I would rather go birding than do most anything else

McFarlane, 2004; Vehicle-based campers "behavior" (p. 314)	• Years of camping experience • No. of trips to the study site • No. of years since first visit • No. of camping trips per year to various types of campgrounds
McFarlane, 2004; Vehicle-based campers "cognitive" in-lieu of skills and knowledge (p. 314)	• Self-reported skill-level

(table continues)

Dimensions	Way in which the dimension was measured
"affective", this measure was derived from McIntyre's (1989) measure of enduring involvement (p. 314)	• Agreement/Disagreement with the following statements: o When I am camping I can really be myself o Camping offers me relaxation when life's problems really build up o Camping says a lot about who I am o Camping is very important to me o Camping is one of the most satisfying things I do o Camping is one of the most enjoyable things I do o Camping is nothing more than a place to stay when I do other things o Most of my friends are in some way connected to camping o I enjoy discussing camping with my friends o I find a lot of my life is organized around camping

(table continues)

Dimensions	Way in which the dimension was measured
McFarlane, 2004; Vehicle-based campers	

"affective", this measure was derived from McIntyre's (1989) measure of enduring involvement (p. 314)	• Agreement/Disagreement with the following statements:
	  ○ I do not particularly like camping
	  ○ You can tell a lot about a person when you see them camping
	• I have little or no interest in camping

Oh, Ditton, Anderson, Scott, & Stoll, 2005; Anglers	
"behavior" (p. 268)	• Total no. of days fished in freshwater in the past 12 months • Total no. of days fished in a specific reservoir in the past 12 months
"skills and knowledge" (p. 268)	• Self-identified skill level
"commitment" (p. 268)	• Participation in fishing tournament events • Replacement cost of fishing equipment • Membership in a fishing club or organization
Scott et al, 2005; Birdwatchers	
"behavior" (p. 65)	• No. of trips within the past 12 months • No. of days spent birding within the past 12 months
"skill" (p. 65)	• Relative skill to other birders

(table continues)

Dimensions	Way in which the dimension was measured
Scott et al, 2005; Birdwatchers	
"commitment" (p. 65)	• Membership in conservation organization • Importance of birding relative to other recreational activities • Total replacement cost of all birding equipment
Salz & Loomis, 2005; Anglers	
perceived experience level while participating	• Selection from a list of four statements concerning respondents' perceived experience level while participating
perceived familiarity with the activity	○ Selection from a list of four statements concerning respondents' familiarity with fishing
"relationships" (p. 193)	• Selection from a list of four statements concerning respondents' relationships to other fishermen
"commitment" (p. 193)	• Selection from a list of four statements concerning respondents' commitment to the activity
Burr & Scott, 2005; Bird watchers	
"behavior" (p. 31)	• Trips taken within the previous 12 months • No. of days spent birding over the past 12 months

(table continues)

Dimensions	Way in which the dimension was measured
"skill" (p. 31)	• Birds identifiable w/o field guide
	• Birds identifiable by sound
"commitment" (p. 31)	• Self-identified level of involvement in birding
Oh & Ditton, 2006; Anglers	
"behavioral" (p. 375)	• Total days fished in the past 12 months
	• Total days fished in saltwater in the past 12 months
"skill and knowledge" (p. 375)	• Self-identified skill level for all fishing activities
	• Self-identified skill level for saltwater fishing activities
	• Constraint level of developing skill
"commitment" (p. 375)	• Importance of fishing compared to other activities
	• Membership in a fishing club or organization
	• Replacement value of fishing equipment
Thapa et al, 2006; SCUBA divers	
"behavior" (p. 605)	• Years involved in diving
	• Lifetime dives completed
	• No. of dives within the past 12 months
	• No. of times diving within a certain area
	• No. of places dived over a lifetime

(table continues)

Dimensions	Way in which the dimension was measured
"cognitive" (p. 605)	• Self-identified skill level • Confidence level as a diver • Ability to maintain buoyancy control • Amount of diving knowledge
Thapa et al, 2006; SCUBA divers	
"cognitive" (p. 605)	• Ability to adapt to different diving situations • Certification level
"affective", split between enduring involvement and centrality (p. 605)	• Enjoyment in diving • Importance in diving • Self-identification with diving • Organization of life around diving • Diving club membership • Subscription to diving magazines

(table continues)

Dimensions	Way in which the dimension was measured
Kuentzel & Heberlein, 2006; Boaters	
No dimensions identified, rather this paper analyzes panel data on seven variables typical in specialization research	• Boat ownership • Boating frequency on the Great Lakes • Boating frequency on oceans • Participation in boat racing • Self-identified boating skill • Level of interest in boating • Whether or not recreational boating had ceased
Lee & Scott, 2006; Birdwatchers	
"behavior" (p. 25)	• Trips within the past 12 months • Days spent birding within the past 12 months
"skill and knowledge" (p. 25)	• No. of birds identifiable w/o field guide • No. of birds identifiable by sound • Self-identified skill level

(table continues)

Dimensions	Way in which the dimension was measured

"commitment", split into both "behavioral" and "personal" (p. 25)	• Agreement/Disagreement with the following statements:
	  ○ Other leisure activities don't interest me as much as birding (*personal*)
	  ○ If I couldn't go birding, I am not sure what I would do (*behavioral*)
	  ○ If I stopped birding, I would probably lose touch with a lot of my friends (*behavioral*)
	• I would rather go birding than do most anything else (*personal*)

Schroder et al, 2006; Anglers "behavioral component" (p. 305)	• Fishing equipment owned relative to other anglers • Amount of fishing equipment owned that is for a specific purpose
"behavioral component" (p. 305)	• Amount of free time spent fishing • Amount of electronic fishing equipment owned

(table continues)

Dimensions	Way in which the dimension was measured
"psychological component" (p. 305)	• Extent other activities are planned around fishing activities • Extent to which long-term friendships have been formed around fishing • Level of distress if fishing were no longer possible • Importance of fishing compared to other things in life
Needham et al, 2007; Deer hunters	
"behavior", split between "equipment" and "experience" (p. 420)	• Agreement/disagreement with the following statements: o I have accumulated a lot of deer hunting equipment (*equipment*) o I have invested a lot of money in deer hunting equipment (*equipment*) • Percentage of life deer-hunting (*experience*)
"cognitive" also referred to as "skills and knowledge" (p. 420)	• Agreement/disagreement with the following statements: Given the deer hunting skills/knowledge that I have developed, it is important that I continue to hunt

(table continues)

Dimensions	Way in which the dimension was measured
"cognitive" also referred to as "skills and knowledge" (p. 420)	• Agreement/disagreement with the following statement: o Testing/improving my deer hunting skills is more important to me than harvesting a deer • Self-assessed skill level

"affective" (p. 420)	• Agreement/disagreement with the following statements:
	  o If I stopped deer hunting, an important part of my life would be missing
	  o Deer hunting is an annual tradition that has become important to me
	  o Participation in deer hunting is a large part of my life
	  o Given the amount of effort I have put into becoming a deer hunter, it would be difficult for me to find another activity to replace deer hunting
	• The amount respondents would miss the activity if they were no longer able to participate in it

[a] McIntyre's study deals directly with measuring "enduring involvement" (p. 169), however, it is noted that because previous research has made a connection between "a variety of indicators including experience, involvement and commitment, and specialization…levels of enduring involvement would be indicative of degrees of specialization" (p. 170). [b] This paper conceptualizes specialization *only* as a product of use frequency. They support their definition by citing previous research which has segmented social worlds solely by frequency of use (e.g., Strauss (1982), Unruh (1979 & 1980)).

APPENDIX C

SURVEY INSTRUMENT

Utah Recreational
Off-Highway Vehicle Use Survey

UtahState
UNIVERSITY

*For the purposes of this study, Off-Highway Vehicles (OHVs) are defined as **any all-terrain vehicle, dune-buggy, rock-crawler, or motorcycle**. This excludes snowmobiles. While snowmobiles are often considered Off-Highway Vehicles, they **are not** within the focus of this study and have been excluded, with the exception of Question 1.*

*This study also **specifically** concerns off-highway **recreational** use on **public lands**. If you only use your OHV for work purposes or you do not recreate on public lands, **don't disregard this survey**. We are still interested in what you have to say, please complete question 1, then skip to question 20 toward the end of the booklet.*

First, please tell us about the types of Off-Highway Vehicles that you own.

1. How many are in each of the following categories?

Off-highway motorcycles or mini-bikes. _____
3 or 4 wheel All-Terrain Vehicles (ATVs). _____
Other non street-legal 4-wheel drive vehicles. _____
Dune buggies or sand rails. _____
Snowmobiles or snowcats. _____

Most Recent Trip

We would like to begin by asking you about your most recent recreation trip during which you used your OHV. Questions 2 through 15 pertain to your most recent trip only.

2. What type of Off-Highway Vehicle did you use on your **most recent trip** (Please select all that apply)?

☐ Off-highway motorcycle, mini-bike, etc.
☐ ATV, etc.
☐ Other non street-legal 4-wheel drive vehicles.
☐ Dune buggy, sand rail, etc.

3. In what month and year was your **last** recreation trip when you **used an OHV**?

Month _____ Year _____

4. In which Utah County or adjacent state was that **trip taken**? (Use the **map** at the end of this booklet to assist you).

☐ Beaver	☐ Iron	☐ Sevier	☐ Arizona
☐ Box Elder	☐ Juab	☐ Summitt	☐ Colorado
☐ Cache	☐ Kane	☐ Tooele	☐ Idaho
☐ Carbon	☐ Millard	☐ Uintah	☐ Nevada
☐ Daggett	☐ Morgan	☐ Utah	☐ New Mexico
☐ Davis	☐ Piute	☐ Wasatch	☐ Wyoming
☐ Duchesne	☐ Rich	☐ Washington	
☐ Emery	☐ Salt Lake	☐ Wayne	☐ Other States
☐ Garfield	☐ San Juan	☐ Weber	
☐ Grand	☐ San Pete		☐ Don't Know

5. What is the name of the area or trail where your **last trip** occurred?

_____

6. Are you aware of which agency is responsible for the management of that area?

- ☐ Yes
- ☐ No

6a. If **yes,** which agency is it (Check all that apply)?

- ☐ USDA Forest Service
- ☐ Bureau of Land Management
- ☐ Utah State Parks
- ☐ Other, please specify: _____

7. For your **most recent trip**, how **satisfied** were you with the availability of information about rules, hazards, and conditions? This includes maps, brochures, newsletters, laws, etc.

Strongly dissatisfied	Somewhat dissatisfied	Neutral	Somewhat satisfied	Strongly satisfied
☐	☐	☐	☐	☐

7a. How **important** to you is it that this information is available?

Not important at all	Not very important	Neutral	Moderately important	Very important
☐	☐	☐	☐	☐

8. Again for your **most recent trip**, how **satisfied** were you with the availability of trailhead facilities? This includes restrooms, water, unloading ramps, signs, garbage receptacles, camping areas, etc.

Strongly dissatisfied	Somewhat dissatisfied	Neutral	Somewhat satisfied	Strongly satisfied
☐	☐	☐	☐	☐

8a. How **important** to you is it that these facilities are provided?

Not important at all	Not very important	Neutral	Moderately important	Very important
☐	☐	☐	☐	☐

9. Continuing with your **most recent trip**, how **satisfied** were you with the maintenance of site facilities and maintenance of the OHV trail or area?

Strongly dissatisfied	Somewhat dissatisfied	Neutral	Somewhat satisfied	Strongly satisfied
☐	☐	☐	☐	☐

9a. How **important** to you is it that the site facilities and the OHV trail or area be maintained?

Not important at all	Not very important	Neutral	Moderately important	Very important
☐	☐	☐	☐	☐

10. For this trip, how **satisfied** were you with the provision of trail or area signs? These signs can be directional, reassurance, informational, caution, etc.

Strongly dissatisfied	Somewhat dissatisfied	Neutral	Somewhat satisfied	Strongly satisfied
☐	☐	☐	☐	☐

10a. How **important** to you is it that these signs are provided?

Not important at all	Not very important	Neutral	Moderately important	Very important
☐	☐	☐	☐	☐

11. Again for your **most recent trip**, how **satisfied** were you with the enforcement of rules and regulations by ranger patrols or other enforcement officials?

Strongly dissatisfied	Somewhat dissatisfied	Neutral	Somewhat satisfied	Strongly satisfied
☐	☐	☐	☐	☐

11a. How **important** to you is it that this enforcement is provided?

Not important at all	Not very important	Neutral	Moderately important	Very important
☐	☐	☐	☐	☐

We have a few more questions concerning your **most recent trip**. They relate to your group makeup, the length of your trip, and some expenses that may have been associated with your trip.

12. How many people were with your group?

# of people _____

12a. How many of those people were…

Immediate family (individuals living **in** your household)? _____
Extended family (individuals living **outside** your household)? _____
Friends? _____
Others, please specify: _____ _____

13. How long did your trip last, from the time you left home until the time you returned? (*write in number of hours **OR** number of days*)

Number of hours if one day trip _____
Number of days if overnight trip _____

14. To improve our understanding of how OHV use affects local economies and the state economy we need to know what **you** spent on your **most recent** OHV recreation trip in Utah or elsewhere. Please write down your best estimate of what **you** spent for each kind of item **within** your home county and **outside** of that county.

Item	**Within** your home county	**Outside** of your home county
Lodging: Includes hotels, motels, bed/breakfasts, cabin or home rentals, public or private campgrounds, tents, and campers.	$_____.00	$_____.00
Food and Beverages purchased at grocery stores.	$_____.00	$_____.00
Food and Beverages purchased at restaurants and convenience stores.	$_____.00	$_____.00
Transportation: Includes gasoline and oil for your transportation/tow vehicle, gasoline and oil for your OHV(s), and repairs/services on both your transportation/tow vehicle and your OHV(s).	$_____.00	$_____.00
Parking, trail use, and area access fees.	$_____.00	$_____.00
Rental fees and supplies: Includes RVs, trailers, other OHV(s), and fishing and hunting supplies.	$_____.00	$_____.00
Entertainment: Includes movies, amusement, etc.	$_____.00	$_____.00
Retail goods other than food and beverages.	$_____.00	$_____.00

15. On **this trip**, what **recreation activities** did you participate in? (*check all that apply)*

- ☐ Driving backroads
- ☐ Dirt biking
- ☐ Hill climbing
- ☐ Trail riding
- ☐ Open-area driving
- ☐ Competitive events
- ☐ Hiking/walking
- ☐ Sightseeing
- ☐ Camping
- ☐ Boating
- ☐ Fishing
- ☐ Hunting
- ☐ Target shooting
- ☐ Swimming
- ☐ Picnicking
- ☐ Visiting Historical/ Archeological sites
- ☐ Photography
- ☐ River running
- ☐ Rock climbing
- ☐ Wildlife/Bird watching
- ☐ Backpacking
- ☐ Cross-country skiing
- ☐ Snowshoeing
- ☐ Other, please specify: _____

Now, we need to ask you some questions about OHV purchases and recreation trips you have taken **in the last 12 months**. Questions 16 through 20 pertain only to recreation trips taken **within the last 12 months**.

Trips Within the Last 12 Months

16. How many off-highway vehicle recreational trips have you taken within the last 12 months for each of the following OHV types?

Vehicle Type	# of Trips within the last 12 months				
	1-5	6-10	11-15	16-20	21+
Off-highway motorcycles or mini-bikes	☐	☐	☐	☐	☐
All-Terrain Vehicles (ATV).	☐	☐	☐	☐	☐
Other 4-wheel drive vehicles or rock-crawlers	☐	☐	☐	☐	☐
Dune buggies or sand rails	☐	☐	☐	☐	☐

17. Now please tell us how many of your trips **within the last 12 months** were to each Utah county or adjacent state. Please use the Utah **map** to assist you.

	# of trips		# of trips		# of trips		# of trips
Beaver	_____	Iron	_____	Sevier	_____	Arizona	_____
Box Elder	_____	Juab	_____	Summit	_____	Colorado	_____
Cache	_____	Kane	_____	Tooele	_____	Idaho	_____
Carbon	_____	Millard	_____	Uintah	_____	Nevada	_____
Daggett	_____	Morgan	_____	Utah	_____	New Mexico	_____
Davis	_____	Piute	_____	Wasatch	_____	Wyoming	_____
Duchesne	_____	Rich	_____	Washington	_____		
Emery	_____	Salt Lake	_____	Wayne	_____	Other States	_____
Garfield	_____	San Juan	_____	Weber	_____		
Grand	_____	San Pete	_____				

18. For the area that you use most often, why do you ride in this area?

- ☐ It is easy to get to.
- ☐ It is one of my favorite places to ride.
- ☐ There is no other place to ride.
- ☐ I can afford to go there.
- ☐ Other, please specify:_____

19. Do you have any OHV trips that you take on the same time or days of the year to a particular location? *(Eg. Holidays or festival trips or perhaps family reunions.)*

_____ Yes
_____ No

19a. If **Yes**, please indicate the place where you go, the date, or holiday when you typically go, and the purpose for the trip **(if there are multiple trips, please list them separately)**.

OHV area or trail: _____
Date or holiday: _____
Purpose: _____

OHV area or trail: _____
Date or holiday: _____
Purpose: _____

20. Please write down your best estimate of what you spent **within the last 12 months** for each kind of item:

OHV Expenses: Includes OHVs purchased, custom parts/installation, tools, tires/rims, parts/repairs.	$_____.00
OHV Insurance:	$_____.00
Licenses, permits, and emissions checks:	$_____.00
Vehicles purchased **specifically** to tow your OHVs:	$_____.00
Support Equipment: Includes equipment purchased exclusively for OHVs.	$_____.00
Repairs and Services: Includes repairs/services on both your transportation/tow vehicle and your OHV(s).	$_____.00
Rental fees and supplies: Includes RVs, trailers, other OHV(s), and fishing and hunting supplies.	$_____.00
Out-of-pocket medical costs related to your OHV use	$_____.00
Miscellaneous Includes riding apparel, safety gear, emergency supplies, memberships, and entry fees.	$_____.00

21. Now, for your **entire lifetime**, how much would you estimate that you have invested in OHV equipment? This includes vehicles, custom parts, installation, and support equipment like tools.

$_____ .00 over my **entire lifetime**.

We just have a few more questions about your experience and your opinion on different fees for OHV management.

Experience

22. How many years have you been riding Off-Highway Vehicles?

_____ # of years

23. How would you rate your skill level in driving your OHV?

- ☐ Beginner
- ☐ Novice
- ☐ Intermediate
- ☐ Advanced
- ☐ Expert

24. Many trail systems around the state are now designating their routes according to difficulty. Of the following trail ratings, which do you prefer to ride on?

- ☐ Easiest (relatively smooth throughout).
- ☐ More difficult (narrow sections, steep grades, minor drop-offs).
- ☐ Most difficult (sharp turns, steep side-slopes, exposure to large drop-offs).
- ☐ Extreme (extremely steep and rocky with ledges and severe drop-offs).

25. Please indicate the extent to which you would oppose, favor, or feel neutral towards each of the following methods to raise funds for the OHV management actions listed in questions 7 thru 11 (availability of information, trailhead facilities, site maintenance, trail or area signs, and enforcement).

	Strongly Oppose	Somewhat Oppose	Neutral	Somewhat Favor	Strongly Favor
Daily use fee for certain heavily used areas (e.g., Paiute, Shoshone, Hog Canyon, other)	☐	☐	☐	☐	☐
Additional Utah state tax on sale of new OHVs	☐	☐	☐	☐	☐
Trailhead parking fees for **all** users	☐	☐	☐	☐	☐

Activities/Motivations

26. Below is a list of your possible reasons for OHV riding. Please tell us how important each one is to you when you go riding.

The OHV allows me to:	Not important at all	Not very important	Neutral	Somewhat important	Very Important
Stress Relief and Nature Appreciation					
Enjoy natural scenery.	☐	☐	☐	☐	☐
Get away from the demands of life.	☐	☐	☐	☐	☐
Experience personal freedom.	☐	☐	☐	☐	☐
Experience solitude.	☐	☐	☐	☐	☐
Release or reduce built-up tension.	☐	☐	☐	☐	☐
Share Similar Values					
Be with other people who enjoy the same activities that I do.	☐	☐	☐	☐	☐
Be with members of my group.	☐	☐	☐	☐	☐
Achievement/Stimulation					
Do something challenging.	☐	☐	☐	☐	☐
Enjoy a place that is special to me.	☐	☐	☐	☐	☐
Experience excitement.	☐	☐	☐	☐	☐
Develop my skills and abilities.	☐	☐	☐	☐	☐
Test the capabilities of my vehicle.	☐	☐	☐	☐	☐
Learn New Things					
Experience new and different things.	☐	☐	☐	☐	☐
Learn more about the natural history of an area.	☐	☐	☐	☐	☐
Independence					
Do things my own way.	☐	☐	☐	☐	☐
Be in control of things that happen.	☐	☐	☐	☐	☐
Teach/Lead Others					
Help others develop their skills.	☐	☐	☐	☐	☐
Share what I have learned with others.	☐	☐	☐	☐	☐
Lead other people.	☐	☐	☐	☐	☐
Meet new people					
Talk to new and varied people.	☐	☐	☐	☐	☐
Observe other people in the area.	☐	☐	☐	☐	☐

Environmental Attitudes

27. Finally, we would like to get your opinion on a wide range of environmental issues. The following questions were asked on a national survey of OHV users affiliated with the **National Off-Highway Vehicle Conservation Council (NOHVCC)**. We would like to ask the **exact same questions** of Utah OHV users to determine both similarities and differences between nationwide OHV users and users in Utah.

For each of the following statements, please indicate the extent to which you agree or disagree.

	Strongly Disagree	Somewhat Disagree	Neutral/ Unsure	Somewhat Agree	Strongly Agree
We are approaching the limit of the number of people the Earth can support.	☐	☐	☐	☐	☐
Humans have the right to modify the natural environment to suit their needs.	☐	☐	☐	☐	☐
When humans interfere with nature, it often produces disastrous consequences.	☐	☐	☐	☐	☐
Human ingenuity will insure that we do not make the Earth unlivable.	☐	☐	☐	☐	☐
Humans are severely abusing the environment.	☐	☐	☐	☐	☐
The earth has plenty of natural resources if we just learn how to develop them.	☐	☐	☐	☐	☐
Plants and animals have as much right as humans to exist.	☐	☐	☐	☐	☐
The balance of nature is strong enough to cope with the impacts of modern industrial nations.	☐	☐	☐	☐	☐
Despite our special attributes, humans are still subject to the laws of nature.	☐	☐	☐	☐	☐
The so-called "ecological crisis" facing humankind has been greatly exaggerated.	☐	☐	☐	☐	☐
The Earth has a finite amount of room and resources.	☐	☐	☐	☐	☐
Humans were meant to rule over the rest of nature.	☐	☐	☐	☐	☐
The balance of nature is delicate and easily upset.	☐	☐	☐	☐	☐
Humans will eventually learn enough about how nature works to be able to control it.	☐	☐	☐	☐	☐
If things continue on their present course, we will soon experience a major ecological catastrophe.	☐	☐	☐	☐	☐

Demographics

Now, we would like to know some general information about you and your family in order to make comparisons among the many kinds of visitors to public lands in Utah. Remember that all information is voluntary and confidential and will not be identified with your name.

28. What is the highest level of education you have completed?

- ☐ Less than a high school degree
- ☐ High school degree or GED
- ☐ Some college or a community college
- ☐ 2 year technical or associate degree
- ☐ 4 year college degree (BA, BS)
- ☐ Advanced degree (MA, MS, JD, MD, Ph.D.)
- ☐ Don't Know/Refuse

29. How many years have you lived in Utah?

_____ # of years

30. In which county do you currently live?

_____

31. How many years have you lived in your current county?

_____ # of years

32. Before taxes, for 2006, what was your total household income?

- ☐ Under $15,000
- ☐ $15,000 -- $24,999
- ☐ $25,000 -- $34,999
- ☐ $35,000 -- $49,999
- ☐ $50,000 -- $74,999
- ☐ $75,000 -- $99,999
- ☐ $100,000 -- $149,999
- ☐ $150,000 -- $200,000
- ☐ Over $200,000
- ☐ Don't Know/Refuse

33. In what year were you born?

19___

34. How many children do you have under 18?

_____ # of children

35. How many people live in your household in the following age groups?

Under 15 _____
15-24 _____
25-54 _____
55 – 64 _____
65 or older _____

36. What is your present marital status?

☐ Single
☐ Married
☐ Separated/Divorced
☐ Widowed

37. Which of the following best describes your ethnic origin?

☐ White
☐ African American
☐ Hispanic
☐ Native American
☐ Asian American or Pacific Islander
☐ Other: _____

38. Do you currently belong to any of the following kinds of **organizations**?

☐ Conservation/Protection groups (Audubon Society, Sierra Club, etc.)
☐ Wildlife conservation groups (Ducks Unlimited, R. M. Elk Foundation, etc.)
☐ Fish conservation groups (Trout Unlimited, etc.)
☐ Rod and gun clubs
☐ Sportsman/Sportswomen groups
☐ Motorcycle clubs
☐ Dune-buggy clubs
☐ Jeep and four-wheel drive owners' associations
☐ ATV/OHV clubs
☐ Other (please specify): _____

39. With respect to your political views, do you consider yourself to be a:

☐ Conservative
☐ Moderate conservative
☐ Moderate
☐ Moderate liberal
☐ Liberal
☐ Other

Thank you for your participation in this survey!

PLEASE TAPE OR STAPLE THE CORNERS OF THE SURVEY AND DROP IT IN THE MAIL.

NO POSTAGE IS NEEDED.

If you have any further comments you wish to make, please use the space below.

_____
_____
_____
_____
_____
_____

APPENDIX D

RESPONSES TO THE 15 NEW ECOLOGICAL PARADIGM SCALE STATEMENTS

Table 23

Responses to the 15 New Ecological Paradigm Scale Statements

Statement (Intended measure)	Strongly Disagree	Somewhat Disagree	Neutral/ Unsure	Somewhat Agree	Strongly Agree
We are approaching the limit of the number of people the Earth can support. (Limits to Growth)	25.6% (150)	20.3% (119)	25.8% (151)	19.1% (112)	9.1% (53)
Humans have the right to modify the natural environment to suit their needs. (Anti- anthropocentricism)	21.0% (122)	32.8% (190)	13.4% (78)	26.0% (151)	6.7% (39)
When humans interfere with nature, it often produces disastrous consequences. (Balance to nature)	9.7% (57)	23.0% (135)	15.2% (89)	30.9% (181)	21.2% (124)
Human ingenuity will insure that we do not make the Earth unlivable. (Anti-exemptionalism)	8.9% (52)	19.7% (115)	30.8% (180)	30.5% (178)	10.1% (59)
Humans are severely abusing the environment. (Eco-crisis)	12.3% (72)	24.4% (143)	12.8% (75)	36.1% (211)	14.4% (84)

(table continues)

Statement (Intended measure)	Strongly Disagree	Somewhat Disagree	Neutral/ Unsure	Somewhat Agree	Strongly Agree
The earth has plenty of natural resources if we just learn how to develop them. (Limits to growth)	4.1% (24)	11.8% (69)	12.8% (75)	42.2% (247)	29.2% (171)
Plants and animals have as much right as humans to exist. (Anti-anthropocentricism)	7.3% (43)	10.4% (61)	14.8% (87)	30.0% (176)	37.4% (219)
The balance of nature is strong enough to cope with the impacts of modern industrial nations. (Balance to nature)	14.8% (86)	34.9% (203)	26.5% (154)	18.8% (109)	5.0% (29)
Despite our special attributes, humans are still subject to the laws of nature. (Anti-exemptionalism)	1.2% (7)	1.4% (8)	11.4% (67)	45.7% (268)	40.4% (237)
The so-called “ecological crisis” facing humankind has been greatly exaggerated. (Eco-crisis)	7.0% (41)	18.9% (110)	26.3% (153)	29.6% (172)	18.2% (106)
The Earth has a finite amount of room and resources. (Limits to growth)	13.5% (79)	22.1% (129)	22.8% (133)	26.9% (157)	14.7% (86)

(table continues)

Statement (Intended measure)	Strongly Disagree	Somewhat Disagree	Neutral/ Unsure	Somewhat Agree	Strongly Agree
Humans were meant to rule over the rest of nature. (Anti-anthropocentricism)	21.7% (126)	20.5% (119)	20.7% (120)	22.0% (128)	15.1% (88)
The balance of nature is delicate and easily upset. (Balance to nature)	4.4% (26)	18.6% (109)	18.4% (108)	36.0% (211)	22.5% (132)
Humans will eventually learn enough about how nature works to be able to control it. (Anti-exemptionalism)	23.0% (134)	30.4% (177)	25.7% (150)	17.8% (104)	3.1% (18)
If things continue on their present course, we will soon experience a major ecological catastrophe. (Eco-crisis)	17.6% (103)	20.9% (122)	28.0% (164)	24.3% (142)	9.2% (54)

Note. Frequencies are reported as the question was asked. Scores have not been reversed based on the coding of the question.

APPENDIX E

CORRELATION COMPONENT MATRIX FOR THE EXPLORATORY FACTOR ANALYSIS OF THE NEW ECOLOGICAL PARADIGM SCALE

Table 24

Correlation Component Matrix for the Exploratory Factor Analysis of the New Ecological Paradigm Scale

Statement (Intended measure)	Component 1	2	3	4
We are approaching the limit of the number of people the Earth can support. (Limits to growth)	.641	.069	.185	-.300
Humans have the right to modify the natural environment to suit their needs. (Anti-anthropocentricism)	.639	.123	-.157	-.071
When humans interfere with nature, it often produces disastrous consequences. (Balance to nature)	.682	-.273	.058	-.020
Human ingenuity will insure that we do not make the Earth unlivable. (Anti-exemptionalism)	.477	.524	.022	.048
Humans are severely abusing the environment. (Ecological crisis)	.725	-.227	.168	-.011

(table continues)

	Component			
Statement (Intended measure)	1	2	3	4
The earth has plenty of natural resources if we just learn how to develop them. (Limits to growth)	.372	.495	.336	.294
Plants and animals have as much right as humans to exist. (Anti-anthropocentricism)	.578	-.267	-.352	-.186
The balance of nature is strong enough to cope with the impacts of modern industrial nations. (Balance to nature)	.604	.031	.095	.307
Despite our special attributes, humans are still subject to the laws of nature. (Anti-exemptionalism)	.398	-.354	-.483	.443
The so-called “ecological crisis” facing humankind has been greatly exaggerated. (Ecological crisis)	.737	.062	.167	-.123
The Earth has a finite amount of room and resources. (Limits to growth)	.034	-.319	.545	.508

(table continues)

	Component			
Statement (Intended measure)	1	2	3	4
Humans were meant to rule over the rest of nature. (Anti-anthropocentricism)	.643	.247	-.163	-.281
The balance of nature is delicate and easily upset. (Balance to nature).	.692	-.318	-.044	.036
Humans will eventually learn enough about how nature works to be able to control it. (Anti-exemptionalism)	.346	.406	-.449	.478
If things continue on their present course, we will soon experience a major ecological catastrophe. (Ecological crisis)	.752	-.057	.229	-.085